R
853
U56167
1966

DIVISION OF RESEARCH SERVICES

ANNUAL REPORT

July 1, 1965, through June 30, 1966

R
853
U56/67
1966

United States. National Institutes of Health

DIVISION OF RESEARCH SERVICES

Report of Program Activities
July 1, 1965, through June 30, 1966

LIBRARY
JUL 27 1967
National Institutes of Health

CONTENTS

Page

Division of Research Services ---------- 1

Research Facilities Planning Branch ---------- 7

Plant Engineering Branch ---------- 19

Environmental Services Branch ---------- 35

Library Branch ---------- 43

Biomedical Engineering and Instrumentation Branch ---------- 49
Individual Project Reports
1. Artificial Kidney Center ---------- 62
2. Automatic Microtitration Study ---------- 63
3. Heart Assist Pump ---------- 65
4. Shock Damage Instrumentation ---------- 67
5. Utility of the Laser in Biological Research and Clinical Applications ---------- 68
6. Automated Sample Combustion Development ---------- 70
7. Automated Urinalysis Development ---------- 71
8. Microbiology Automation ---------- 72
9. Prevention of Thrombosis on Intravascular Prostheses -- 73

Medical Arts and Photography Branch ---------- 75

Laboratory Aids Branch ---------- 83
Individual Project Reports
1. The Effect of Light on the Productivity of Mice ------ 100
2. Chronic Murine Pneumonia of the Albino Rat ---------- 102
3. Focal Necrosis of the Liver of Rabbits ---------- 104
4. Salmonellosis in Guinea Pigs ---------- 105
5. A Study to Determine the Epizootiology of Tyzzer's Disease in Rabbits ---------- 107
6. The Effect of Certain Bacterial Species on Chronic Respiratory Disease of Rats ---------- 108
7. Investigations of Equine Influenza ---------- 109
8. Mycobacteriosis in the Opossum ---------- 111
9. Evaluation of Attenuated Shigella Vaccines ---------- 113
10. An Epizootic of Measles in a Colony of Rhesus Monkeys (M. Mulatta) ---------- 115
11. Febrile Hemorrhagic Disease of Monkeys ---------- 116

Page

12. Effects of Cervical Vagotomy on Water and Electrolyte Secretion in the Chronic Cardiac Denervated Dog ---------- 118
13. Use of Synthetic Materials in Repair of Ruptured Canine Anterior Cruciate Ligament ---------- 119
14. Evaluation of Radiation Therapy on Canine Malignant Lymphoma ---------- 121
15. Color Description of Cats ---------- 123
16. Acute Respiratory Disease in Procured Adult Dogs Held for Quarantine at the National Institutes of Health Animal Center (NIHAC) ---------- 124

U.S. PUBLIC HEALTH SERVICE - NATIONAL INSTITUTES OF HEALTH

DIVISION OF RESEARCH SERVICES

Report of Program Activities
July 1, 1965, through June 30, 1966

A. Objectives

The Division of Research Services was established in 1956 to provide professional and technical support to the medical research programs of the National Institutes of Health. In April 1966 DRS celebrated its 10th anniversary, reflecting on a decade of supplying scientific, technical, and engineering services to sustain and further NIH research programs. By keeping informed of these Institute programs, DRS is able to plan its own efforts to meet the daily requirements of the Institutes. The organization, staffing, and functions of DRS are adjusted accordingly to maintain an effective program of centralized services.

B. Current Programs

The Division of Research Services comprises some 1,300 persons with almost 200 individual occupational skills and is composed of an Office of the Chief and seven branches: Environmental Services, Biomedical Engineering and Instrumentation, Laboratory Aids, Library, Medical Arts and Photography, Plant Engineering, and Research Facilities Planning.

The programs of the Division can be divided into two broad classifications:

1. Programs in direct support of research

   a. Design, development, and fabrication of instruments and materials
   b. Biomedical engineering of methods and systems
   c. Production of bacteriologic and tissue culture media
   d. Preparation of sterile glassware
   e. Production of genetically defined rodents and rabbits
   f. Quarantine and conditioning of dogs, cats, and primates
   g. Maintenance of farm animals
   h. Animal surgery and recovery
   i. Animal health services
   j. Still and motion picture photography
   k. Graphic arts services and exhibits design
   l. Medical illustration and model making
   m. Library services
   n. Foreign language translation

2. Programs related to NIH facilities and proper environment

   a. Engineering liaison in the design and construction of new NIH facilities

b. Development of improved facilities and equipment
c. Operation, maintenance, and repair of the NIH physical facilities
d. Professional engineering and craft services for alterations, improvements, and installations
e. Maintenance of the NIH grounds
f. Environmental services designed to maintain and improve the health of NIH patients and employees

C. Program Progress and Accomplishments

Construction

Construction activities continued to expand at NIH, with DRS providing engineering liaison in the design and construction of new facilities. The current program of the Research Facilities Planning Branch comprises over 20 major projects with a total estimated cost of more than 75,000,000 in the planning, design, or construction stage. Seven projects were under construction in FY 1966, and two of these were completed. Design for several other buildings is nearly complete, and these will move into the construction phase in FY 1967. The extension of the General Office Building (31C) is expected to begin in August 1966. Beneficial occupancy should be effected in the spring of 1968. Multilevel parking facilities for Building 31 and the NCI-NIMH/NINDB buildings are planned, and the programs of requirements are in official clearance channels. Progress beyond the tentative sketches for the Child Research Center (NIMH) has been stopped pending selection of a new site on the south side of the NIH reservation. An addition to Building 21 is being planned, and work on the program of requirements is in progress. Construction of the new Biologics Standards Building (29A) is well underway. Beneficial occupancy should be realized in December 1966. Another project underway is the NCI-NIMH/NINDB complex and cafeteria (Bldgs. 35, 36, and 37). A new Gerontology Building, being built in Baltimore, Md., is scheduled for occupancy in the fall of 1967.

The proposed new Library facility and the Cafeteria extension in the Clinical Center (Bldg. 10) have been combined as a single project. A construction contract was awarded in April 1966, and construction is scheduled for completion in August 1967.

In 1966 funds were appropriated to expand Clinical Center facilities by adding two floors to the existing Wing D. It is estimated that construction will be completed by May 1968.

The program of requirements for a Virus Isolation Facility for the National Cancer Institute was completed in September 1965. Design was completed in May 1966, and construction completion is scheduled for early 1968.

Repair and Improvement

The increase in workload for engineering services was the most significant development. Construction performed by private contractors increased about fourfold. Engineering and planning staffs assumed an additional heavy workload due to the major improvements and new building construction at NIH.

Studies were made during the year designed to improve the capacities of the incinerator plant and the steam generating plant. Estimated results of one study showed that the capacity of the steam generating plant will be exceeded during 1968. A study is being made to determine whether it is feasible for NIH to combine with other federal agencies in using a central incinerator. To meet the need for more steam, an additional boiler is to be installed as part of the overall utility updating.

Extension of the drought through the third year (1962-1965) has had an adverse effect on the NIH grounds. New construction and a shortage of maintenance personnel have not helped the problem. Steps are being taken to alleviate the situation.

NIH Animal Center

Phase I of a three-phase construction program was completed last year. This included a farm animal building, a kennel building, a central utilities building, and two residences. Construction on Phase IA is scheduled to start in the fall of 1966. This phase will include a general laboratory building, an animal behavior laboratory and a waterfowl habitat for the National Institute of Mental Health, a primate building for the Laboratory Aids Branch, DRS, additional utilities, and an incinerator. Phase II will include an agricultural management building, an animal production facility, a waste chemical disposal facility, a third residence, and necessary supporting utilities and grounds improvements. This phase is still in the early stages and has not yet been approved by the Bureau of the Budget.

Instrumentation Support

The growing importance of biomedical engineering and instrumentation became increasingly evident during the past year at NIH. This area of professional and technical support has been significantly expanded. The Biomedical Engineering and Instrumentation Branch has been reorganized for improved utilization of research and development potential. Also, "satellite" technical support units have been established, improved workload and financial reporting with extension of automatic data processing has been accomplished, and a vigorous professional and technical training program has been undertaken. Branch professionals have made extensive contributions to programs involving mechanization, automation, computation, physiological monitoring, artificial organs, surgical procedures, analytical instrumentation, and laser technology.

Technical service sections processed more than 13,000 assignments, and Branch engineers were involved with approximately 400 various research and development projects.

The improved effectiveness of support in this area to NIH medical research programs results directly from emphasis on the enhancement of the role of the professional physical scientists and engineers as collaborators and prime contributors in health research rather than as subordinate service staff.

Shop Service Improvements

In FY 1965, preliminary steps were taken to initiate a material pre-packaging program. The program is designed to reduce the lost time resulting from shop employees having to wait in line at the Shop Stores issue counter when drawing out repair parts and construction materials. During FY 1966 an implementation schedule was developed, the basic criteria were established, and several pilot jobs were processed under the procedures. Initially, the program is being limited to pre-selected shop jobs involving over 250 man-hours of station labor. Within the availability of storage space and other limitations, this program was scheduled to be in full operation by July 1, 1966.

Full operation of the tool control program, including the operation of several satellite toolrooms, was scheduled to be in effect by July 1, 1966. Major planning for this program was completed in FY 1965. The tool crib area was cleared, and a substantial start was made in inventorying the tools and equipment to be included in the program. Initial requirements for storage cabinets and shelving were determined, and the cabinets and shelves were ordered. A schedule for implementation of the program was developed.

Library Services

Further implementation of the internship, bibliographical services, automation, and workload reporting programs was achieved during FY 1966. Specifications and equipment lists were prepared for the new library. Tentative plans were developed for moving personnel, collection, and equipment to the new library annex without major interruptions in service. Strong emphasis was placed on staff training programs during the year. A total of 37,537 books and journals were circulated, representing a decrease of 442 volumes since last year. The decrease results from restricting the circulation of materials of which only one copy is owned by the Library. Also, during FY 1966, 4,666 volumes were loaned to other libraries and 9,736 volumes borrowed from other libraries. Translations loaned to other libraries totaled 4,465.

During the year, the Library's collection was strengthened by the addition of 5,247 new books and by the receipt of 831 books through gift and exchange. For FY 1966, the Library placed subscriptions to more than 2,000 journal titles and received an additional 800 as gifts or on exchange.

A proposal for a satellite library for the Division of Computer Research and Technology was prepared. It is expected that this proposal will serve as a prototype for future satellite libraries at NIH.

Medical Arts and Photography

Reorganization of these activities has resulted in improved services. Medical and general art services were sharpened by organizational and policy changes. A work performance record was set by the Drafting Unit. Unusual pieces of medical art were drawings of the developmental stages of four newly discovered simian malaria parasites, models of arthritically crippled hands and feet,

a model of the human eye, and a new complete rat cranial atlas. A 1966 exhibit has been requested for long-term showing in the Smithsonian Institution.

In photography, trials are being made using roll film instead of cut film for use with patient and other clinical and scientific photography. There is also a slight trend toward increasing use of 2" x 2" slides over the heavy $3\frac{1}{4}$" x 4" size. Requests for motion picture work increased, especially for films of the "research summary" variety. Filming in support of clinical studies and research projects has continued. Capability in animation has increased.

Environment Control

Though long-term projects in this area increased in FY 1966, the bulk of the work continued to be on a short-term basis, solving day-to-day problems of researchers and their co-workers. Greatest program progress was made in activities associated with control of biological hazards. Building 7 was evaluated with regard to its suitability for hazardous work, and a suite for hazardous work was developed for Building 6.

Clean air at NIH has been a major concern for the past decade. An investigation defining the scope of the problem was completed and is serving as the basis for decisions on required changes.

Factors associated with contamination in animal production colonies are becoming increasingly important. The Building 14 production areas were surveyed to provide methods for solving potential problems in existing facilities and to provide information for use in the design of new facilities.

The laminar air flow concept developed for industrial clean rooms appears to offer a method for improving control of biological air contamination at NIH. A mock-up operating room using the laminar flow type of ventilation system was constructed so that new ideas may be developed and evaluated.

Animal Production

The Division produced over one million laboratory rodents and rabbits in FY 1966. Many animals were bred to specific investigator requirements. Shifts in the production operation were closely geared throughout the year to research requirements. Approximately 90 percent of the intramural needs for rodents and rabbits were provided from NIH breeding colonies.

Germfree Animals

Germfree rats, mice, and guinea pigs are being produced in stainless steel and flexible plastic isolators. A careful monitoring program assures that these animals remain germfree. Limited attempts to develop a diet and system for raising cesarean-derived germfree hamsters have proved unsuccessful. This project is to be pursued because of the great potential value of germfree hamsters for virology research.

Pathogen-free rats and mice are provided through the breeding of cesarean-derived animals within a barrier system. Current methods of producing pathogen-free animals are critically appraised for their suitability to future operations at NIHAC. A program to provide pathogen-free guinea pigs is underway.

Fertile hens' eggs free of the Resistance Inducing Factor (RIF) are produced by maintaining a flock of chickens within the barrier system. The birds are housed in individual cages, bred by artificial insemination, and regularly monitored for the RIF agent.

Animal Health

The most significant problems in the animal production area during FY 1966 related to diseases associated with breaks in sanitation. For example, salmonellosis necessitated eradication of the Strain 13 guinea pig production colony, and the Flemish rabbit colony was almost decimated due to coccidiosis. Fortunately the genetic back-up colony of Strain 13 guinea pigs did not become infected and could be used to reestablish the production colony. Overall sanitary practices and the physical environment have been carefully reviewed with the assistance of the Environmental Services Branch, and corrective actions have been taken wherever feasible.

D. Problems

Construction

Again in FY 1966, one of the most serious problems in the design program was the slippage which occurs in estimating progress schedules. These extensions of the design postpone the construction and beneficial occupancy of the research facility or project. This, in turn, further delays the implementation of the research program for the client institute. As a result of these delays, greater construction costs are incurred due to the escalation.

An analysis of the reasons for these design delays has been made. Two major factors appear to be the causes. The first is an unrealistic (optimistic) time schedule for review of the design. DRS has encouraged the inclusion of more realistic review periods in the design contracts. The second factor is lack of personnel to properly review the design. Personnel staffing in the Design Division of the Public Buildings Service, GSA, has been reduced in the past year by losses due to retirement and resignation. Vacancies created by these losses have not been filled. The PBS has also experienced an increase in its workload. The problem pertaining to the delays has been brought to the attention of responsible GSA officials regularly and continually by representatives of DRS and RFPB. No relief is in sight.

One additional factor in the delays can be attributed to the review of other groups such as the Commission of Fine Arts, the National Capital Planning Commission, the Maryland-National Capital Park and Planning Commission, and others.

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities July 1, 1965, through June 30, 1966

RESEARCH FACILITIES PLANNING BRANCH

Howard M. Biggs
Branch Chief

I. SUMMARY

A significant increase in construction activity on the NIH Reservation accurately reflects the progress being made in the current NIH facilities expansion program. The present Research Facilities Planning Branch program comprises over 20 major projects having a total estimated cost in excess of $75,000,000 in the planning, design, or construction stage. During FY 1966 seven projects were under construction, two of which were completed. Design for several other buildings is nearly complete, and these will move into the construction phase in FY 1967. Development of design guidelines, use criteria, and materials evaluations in areas such as animal caging, distilled water piping systems, duct materials, and floor and wall coverings provided valuable support and assistance to the design and construction programs of both the NIH and other medical research institutions.

Favorable working relations with Public Buildings Service representatives in both the Central and Regional Offices continue to be essential to the success of the NIH construction program. Therefore, constant effort is being made to improve and strengthen these relationships. The present General Services Administration arrangement of using Architect/Engineer personnel for the detailed inspection and supervision of construction under the general supervision of the PBS Region 3 Project Manager appears to be working satisfactorily. The new PBS Project Manager has rapidly become acclimated to the NIH program and has provided excellent support and counsel to date. General rapport and cooperation between the office of the Project Manager and the RFPB continue to improve.

The very detailed review and appraisal of proposed NIH construction plans by other agencies such as National Capital Planning Commission, Commission of Fine Arts, and Maryland-National Capital Park and Planning Commission, coupled with some differences of opinion between and within these groups, has significantly delayed progress on several projects during the past year. It is hoped that these can be resolved in the very near future.

II. BRANCH PROGRAMS

A. Objectives

The major objective of the RFPB is the coordination of planning and construction of new facilities on the NIH Reservation and at its field stations. This is supplemented with a secondary objective of providing development engineering services and technical assistance where special problems in

design or construction are encountered.

B. Current Programs

The design program is primarily responsible for determining that new construction provides for the program needs of NIH research scientists. A staff of professional engineers is employed to render limited consulting service and to provide coordination between contract architects, NIH research staff members for whom facilities are being provided, and other branches of the Division of Research Services.

The construction program provides close technical control of new facilities for NIH during the construction phases. A staff of management engineers maintains surveillance during construction to determine that the facility is built according to plans and specifications, with particular emphasis on those aspects peculiar to NIH requirements.

The current development program is directed toward improving the functional aspects of facilities presently under design as well as contributing standards, recommendations, and solutions to operational problems encountered in existing NIH facilities. Technical support rendered to the design and construction programs falls into a wide range of activities.

Members of the RFPB staff are frequently called upon to meet and confer with visiting research scientists and engineers relative to current concepts, techniques, and practices in the design and construction of biomedical research facilities. These visitors represent a broad spectrum of national and international medical research activities, both government and private.

C. Progress and Accomplishments (for a summary of all design and construction projects, see Table I and Table II, pp. 16-18.

General Office Building Extension (Building 31C)

This project, authorized in FY 1962 with an appropriation of $700,000 planning funds, was delayed at the Program of Requirements stage by the Bureau of the Budget, pending resolution of the vehicle parking requirements. However, in May 1963 the BOB approved the POR with "on-grade" parking, and the A/E design contract was negotiated in July 1963. Complete working drawings were transmitted in August 1965 and approved by the PBS in October 1965. At this point, it was decided to incorporate a portion of the required utilities construction with this project in order to insure a completed entity for occupancy and avoid conflicts during construction. Final working drawings of the building and the related master utilities were submitted in December 1965 and March 1966, respectively. Construction funds amounting to $5.5 million were provided in the FY 1965 appropriation. Construction is expected to start by August 1966. Beneficial occupancy should be effected in the spring of 1968.

Multilevel Parking Facility for Building 31

This project was authorized in FY 1966 with the appropriation of $111,000 for

planning a multilevel parking structure for 650 cars. The POR was prepared on the basis of an enlarged structure accommodating 1,150 cars; however, the BOB allowance for this facility, approved in December 1965, did not include the required increase in funds. Subsequently, the POR was revised to call for a capacity of 650 cars and in March 1966, with minor revisions requested by DHEW, was resubmitted through channels.

Multilevel Parking for NCI-NIMH/NINDB Buildings

Planning funds for this project, providing a multilevel parking structure for 825 cars, were appropriated in FY 1966. The POR was prepared on the basis of an increase in capacity to 900 cars; however, the BOB allowance for this facility did not include the required increase in funds. Subsequently, the POR was revised to call for a capacity of 825 cars and in March 1966, with minor revisions requested by DHEW, was resubmitted through channels.

Child Research Center (NIMH)

In March 1965, the Research Facilities Advisory Committee reviewed and approved the general layout and space arrangement as delineated in the diagrammatic sketches. The National Capital Planning Commission and the Maryland-National Capital Park and Planning Commission had originally approved the selected site. However, progress beyond the tentative sketches submitted on November 2, 1965, has been stopped pending the outcome of community-sponsored efforts to permit the extension of Woodmont Avenue through a portion of the NIH Reservation to Wisconsin Avenue. This extension would require resiting the CRC facility. NIH has agreed to the Woodmont Avenue extension and the A/E, Johannes & Murray & Associates of Silver Spring, Maryland, has been requested to study the feasibility of selecting a new site in the same vicinity, compatible with the research program.

Master Utilities Extension

This program is divided into two major phases: Phase I, which includes extension and expansion of utility systems required to supply those new facilities under construction, or recently completed, and Phase II, which was planned to provide utilities for the remainder of the buildings proposed under the Master Site Plan. The estimated cost for Phase I planning and construction is $7.5 million. One portion of the Phase I work was accelerated in order to meet the immediate needs of the Central Services Building Extension (Building 12A) and the Extension to the DBS (Building 29A). This work, Phase IA, was completed in January 1966 by Airmaster Services, Incorporated, Silver Spring, Maryland, at a base contract cost of $568,000.

To meet the scheduled needs of the construction program, other portions of Phase I have had to be placed on an accelerated basis. The final working drawings for the new chilled water plant, Building 34, and utilities for Buildings 35, 36, and 37 are completed. Construction will commence early in the summer of 1966. Final working drawings for the remainder of the work are expected in August 1966, with construction to begin in the fall. All Phase I construction should be completed in the fall of 1968.

Representatives of NIH and GSA have been negotiating a contract with the Washington Suburban Sanitary Commission for expansion of the water and sewer services to meet the increased demands of the NIH. These negotiations have extended over a period of two years and have required many discussions. Negotiations should be completed in FY 1967.

NIH Animal Center, Phase IA

The project includes a general laboratory building, animal behavior laboratory and waterfowl habitat for the NIMH, a primate building for Laboratory Aids Branch, DRS, and additional utilities and incinerator. After approval of revised tentative sketches in August 1965, this project was delayed because the A/E requested an additional fee and subsequently asked that his contract be terminated. Upon official notification in December 1965 to proceed with the design, the A/E resumed work. Intermediate working drawings were received by GSA and NIH in April 1966. Construction should start in the fall of 1966.

NIH Animal Center, Phase II

This project includes an agricultural management building, animal production facility, a waste chemical disposal facility, a third residence, and necessary supporting utilities and grounds improvements. The POR was approved by NIH and forwarded through channels to the BOB in November 1965. The BOB delayed approval of the POR and deferred action on a request for apportionment of the planning funds pending receipt of additional justification for the project.

Addition to Building 21

Work on the POR is in progress. After building planning was initiated, a decision was made to provide approximately 1,000 gross square feet for the Animal Hospital Section. Since the original budget request did not include funds for this additional space and the dollar ceiling for the whole project had been set at $500,000, some reduction in the space allocated for the Radiation Safety Department will result. Preparation of the POR is proceeding on this basis.

Warehouse Extension

The selected A/E for this design project is Palmer & Baker, Engineers, who were given the Notice to Proceed with the design on May 5, 1965. In the Diagrammatic Submission of June 1965, the A/E's cost estimate was $120,000 higher than the $670,000 available for the construction contract award. The PBS estimate at this stage indicated that the design would produce a building within available funds.

Due to the failure of PBS to give the A/E a Notice to Proceed with the development of a Master Plan for the warehouse area until October 1965, tentative sketches were not received until December 1965. The A/E's tentative cost estimate was $1,099,536, or $429,000 above the funds available for the construction contract award. Numerous methods have been explored by RFPB, PBS, and the A/E in an effort to reduce the cost of the project. All work on the project was suspended in January 1966 pending determination as to siting

and whether the requirement for a tunnel connection can be deleted. The proposed incinerator facility has affected the siting further.

NINDB/NICHD Research Facility, Puerto Rico

In FY 1963, design and construction funds for a building located at the Puerto Rico Medical Center, housing the NINDB Laboratory of Perinatal Physiology, were authorized. Legal problems with the transfer of the necessary land to the United States Government delayed submission of the POR to the BOB until March 1964.

In June 1964, the BOB approved the POR providing 26,000 gross square feet at a total cost of $850,000. An A/E firm was selected for the design of this facility, but no agreement was reached on the estimated construction costs. In FY 1966, NIH requested, and the Congress authorized, an additional $1.67 million to expand the project to accommodate the NICHD research program. The POR was rewritten and resubmitted through channels to the BOB in September 1965. The BOB approved the POR providing a facility not to exceed 56,000 gross square feet at a total cost of $2.52 million. In February 1966, DHEW approved reprogramming of $200,000 from the total funds for development of an experimental animal compound facility at Sabana Seca, Puerto Rico. Negotiations with the selected A/E firm for design of this project (NICHD/NINDB Research Laboratory) were held in April 1966. Design work is scheduled for completion by August 1967, and beneficial occupancy is expected early in 1969.

NICHD Research Facility

This project was authorized in FY 1966 with the appropriation of $1,000,000 for planning. A POR has been written and is currently being reviewed at NIH. The POR will be submitted for approval of PHS, DHEW, and BOB in July 1966. Construction funds will be required in FY 1968.

Biomedical and Behavioral Research Laboratories for NICHD at NNMC

This project was authorized in FY 1966 for inclusion in the FY 1966 operating budget of NICHD. The POR was completed and forwarded for approval in October 1965 and approved by the OD in January 1966. The Chesapeake Division, Bureau of Yards and Docks, U. S. Navy, was requested to act as Contracting Officer for design and construction. An A/E firm was selected and commenced design work in March 1966. Completion of design is expected by June 1966, and construction will begin shortly thereafter. Construction is expected to be complete by April 1967.

Biologics Standards, Building 29A

The construction contract for this facility, a three-story structure with basement, was awarded in March 1965 to the George Hyman Construction Company at a cost of $4,498,000. Construction of this facility is progressing satisfactorily, and by the end of the fiscal year was approximately 70 percent complete. It is expected that beneficial occupancy will be realized in December 1966.

Gerontology Building, Baltimore, Maryland

Located on the grounds of the Baltimore City Hospital adjacent to the main hospital building, this four-story structure with a two-story mechanical wing is being constructed by John McShain, Incorporated, at a contract cost of $6,989,000. The contract was awarded on October 31, 1965. Although hindered by inclement weather during its initial construction stages, progress to date has been satisfactory. The facility, presently 10 percent complete, is scheduled for completion in the fall of 1967.

NCI-NIMH/NINDB Buildings and Cafeteria (Bldgs. 35, 36, and 37)

The construction contract for this building complex was awarded August 27, 1965, to the Blake Construction Company at a total construction cost of $16,782,000, which includes the contractor's base bid of $14,728,000 and alternates valued at $2,054,000. The complex includes a six-story structure and basement for the NCI, a five-story structure and basement for NIMH/NINDB, and a cafeteria of one story with basement. The Notice to Proceed was issued to the contractor on September 18, 1965, and the scheduled completion date, November 16, 1967, allows 26 months for construction. Although construction was hindered during the winter months because of adverse weather conditions, the project is proceeding on schedule. Construction is approximately 15 percent complete.

Basic Research Laboratory, Lexington, Kentucky

Construction of this facility was completed in the fall of 1965.

Development Projects

Program studies, the majority of which are of short duration, are reported and distributed internally to interested NIH organizations and/or published in trade journals. Requests for available information from extramural activities are also honored. These generally originate through the Division of Research Facilities and Resources.

Limited research contracts continue to be an effective and efficient means for increasing the quality of accomplishment and conserving manpower and money. Such contracts also increase program flexibility and provide detailed specialization where required.

Collaborative Projects

Improving Animal Care Facilities (in collaboration with Laboratory Aids Branch).

The vital importance of laboratory animals to health research has accentuated the need for better quality animals. In recognition of this need, a continuous research and development program to improve animal care and facilities has been in progress. Program investigations are subdivided into categories as follows: (1) product and material testing; (2) prototype development; and (3) factors research. The present studies include: (a) the development of

caging systems for the NIH Animal Center, Phases IA and II; (b) the development of the automated equipment and care procedures with emphasis on watering, feeding, and cage cleaning techniques; and (c) testing and evaluation of standard commercially available products.

RFPB also provides technical assistance and advice to other NIH groups in preparing design guidelines, criteria, specifications, and standards for equipment and facilities.

As a means of stimulating new approaches and introducing new concepts, numerous visits to laboratory and animal facilities were made. Information from private institutions, as well as other government facilities, has served to foster novel ideas and solutions to operational, design, and construction problems here at the NIH.

Informational Reports

1. Fume Hood Exhaust Ducting
2. Specifications for Laboratory Casework Standardization
3. Animal Care and Equipment Catalogue*
4. Economic Analysis of Auxiliary Air Fume Hood Operation
5. Distilled Water Distribution Systems for General Research Laboratories
6. Laboratory Benchtop and Sink Materials Study
7. Wall Coating Survey
8. Floor Covering Survey
9. Research & Development Team Project Reports** (e.g. Primate Caging, Photoperiodism)

* In collaboration with SMB.
** In collaboration with LAB.

D. Problems

One of the most serious problems in the RFPB design program is the slippage which occurs in estimated design progress schedules. These extensions of the design postpone the construction project and beneficial occupancy of the facility. This, in turn, further delays the implementation of the research program for the client institute. As a result of these delays, greater construction costs are incurred due to the escalation.

RFPB has made an analysis of the reasons for these design delays. Two major factors appear to be the causes. The first is an unrealistic (optimistic) time schedule for review of the design. RFPB has encouraged the inclusion of more realistic review periods in the design contracts. The second factor is lack of personnel to properly review the design. Personnel in the Design Division of the Public Buildings Service, GSA, has been reduced in the past year by losses due to retirement and resignation. Vacancies created by these losses have not been filled. The PBS has also experienced an increase in its workload. The problem pertaining to the delays has been brought to the attention of responsible GSA officials regularly and continually by representatives of DRS and RFPB. No relief is in sight.

One additional factor in the delays can be attributed to the review of other groups such as the Commission of Fine Arts, National Capital Planning Commission, the Maryland-National Capital Park and Planning Commission and others.

Some examples of major delays are itemized as follows:

1. Insufficient funds to adequately design Phase IA of the NIH Animal Center contributed toward a delay from August 1965 to January 1966.

2. Considerable delay has occurred on the Warehouse project due to the indecision of NIH on the need for a tunnel connection as well as the site of the proposed incinerator facility.

3. The NIMH Child Research Center has experienced extensive delays due to disagreements between NIH and community groups (Maryland-National Capital Park and Planning Commission and National Capital Planning Commission) over the proposed siting.

4. Negotiations with the WSSC for additional water and sewer services, which are needed for the expanding construction program, have required constant effort and diligent follow-up to accomplish limited progress.

Continued action is being taken by the RFPB to alleviate these problems.

The Public Buildings Service, which has direct responsibility for construction contract administration, continues to encounter difficulty in hiring and retaining competent personnel for construction supervision and inspection. Current A/E contracts for design of NIH facilities include an optional provision for supervision of the construction by the A/E under the direction of the PBS.

E. Program Plans

Construction work will start in FY 1967 on a substantial number of projects which are currently in the design stage. Activity attendant to this increased construction program will require careful planning, coordination, and cooperation to avoid interruption and interference with NIH research activities. Additional staff members to meet the Branch responsibilities in this program have already been recruited and several others will be needed.

The current and future development program will continue to place strong emphasis on the design-support function for the NIH facilities planning, design, and construction program. Areas of investigation presently being studied in depth are as follows:

1. Specifications and Standards for Fume Hood Ducting
2. Ventilation Standards (ESB)*
3. Wall Coating Investigations (continuing study)

* Denotes collaborating organization.

4. Flooring Materials for Animal Areas and Other Applications (continuing study)
5. Planning Cage Washing Areas and Cage Washer Specifications (ESB)*
6. Caging for NIH Animal Center (LAB)*

* Denotes collaborating organization.

F. Publications and Patents

None to report.

TABLE I - RFPB - FY 1966 Program of Authorized Design Projects

Project	Design Completion Date	Construction Completion Date	Construction Cost*	Planning Cost	Total Project Cost	A/E Designer
NIMH/NINDB Bldg.	4/65	11/67	$ 8,620,000	$ 619,000	$ 9,239,000	SH & GA, Inc.**
NCI Building	4/65	11/67	8,867,000	610,000	9,477,000	SH & GA, Inc.**
NCI-NIMH/NINDB Cafeteria Building	4/65	11/67	836,500	53,500	890,000	SH & GA, Inc.**
NIH Animal Center Phase IA	5/66	9/67	1,325,000	125,000	1,450,000	Heery & Heery
NIH Animal Center Phase II	6/67	3/69	7,458,000	517,000	7,975,000	Not selected
Office Bldg. Ext. Bldg. 31C	1/66	4/68	5,850,000	350,000	6,200,000	K, L, & C and C, G, & Van A.**
NINDB-NICHD Res. Facility, P. R.	8/67	2/69	2,192,000	128,000	2,320,000	R, D, and C**
Sabana Seca Facility Puerto Rico	10/66	4/67	186,900	13,100	200,000	Not selected
NICHD NNMC, Ph. II	6/66	4/67	153,700	16,300	170,000	Loewer, Sargent & Assoc.
Gerontology Bldg.	5/65	9/67	8,142,000	358,000	8,500,000	C, S & D & LW, C & W**
Master Util. Ph. I	9/65	7/68	6,839,000	497,000	7,336,000	HDNA**
Warehouse Ext.	10/66	1/68	723,500	56,500	780,000	Palmer & Baker Engrs.
NIMH Child Res. Ctr.	10/66	5/68	930,000	90,000	1,020,000	J & M**
NICHD Res. Fac.	2/68	6/70	9,000,000	1,000,000	10,000,000	Not selected
Multilevel Parking Bldg. 31	3/67	7/68	1,489,000	111,000	1,600,000	K, L, & C and C, G, & Van A**
Multilevel Parking Bldgs. 36 and 37	3/67	7/68	1,985,000	125,000	2,110,000	SH & GA, Inc.**

+ See following page for footnotes.

TABLE I - RFPB - FY 1966 Program of Authorized Design Projects

* Includes construction contract and other construction costs.

** SH & GA, Inc. - Smith, Hinchman & Grylls Associates, Inc.
K, L, & C - Keyes, Lethbridge & Condon
C, G & Van A. - Carroll, Grisdale & Van Alen
C, S & D and LW, C & W - Cochran, Stephenson & Donkervoet and Lucius White, Clay & White
R, D & C - Isadore and Zachary Rosenfield, Fred S. Dubin Associates, and Efrain E. Perez-Chanis
J & M - Johannes & Murray & Associates
HDNA - H. D. Nottingham & Associates

TABLE II

NEW CONSTRUCTION - FY 1966

	Design Completion (Date)	Contract Award (Date)	Construction Schedule (Months)	Contract Completion (Date)	Contract Overrun (Months)	Contract* Amount	Contractor
Basic Research Lab.[1] Lexington, Ky.	3/64	8/19/64	11	7/14/65	2	$ 319,000	Barco, Inc.
Master Utilities Ext.[2] Phase IA	8/64	12/29/64	12	1/1/66	0	568,000	Airmaster Services, Inc.
Biologics Standards[3] Bldg. 29A	11/64	3/16/65	20	11/6/66	-	4,498,000	George Hyman Constr. Co.
NCI-NIMH/NINDB/Cafeteria[3] Bldgs. 35, 36, 37	4/65	9/18/65	26	11/16/67	-	16,782,000	Blake Constr. Co.
Gerontology Building[4] Baltimore, Md.	5/65	10/31/65	23	9/20/67	-	6,989,000	J. McShain Inc.
Biomedical & Behavioral[5] Research Laboratories NICHD-NNMC	5/66	6/30/66 (est)	9 (est)	4/7/67 (est)	-	132,000 (est)	--------

Architect/Engineer

1/ Lawrence D. Cammack
2/ H. D. Nottingham & Associates
3/ SH & G Associates, Inc.
4/ Cochran, Stephenson & Donkervoet and Lucius White, Clay and White
5/ Loever, Sargent & Associates, Inc.

* Does not include contingencies, supervision or planning costs.

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities — July 1, 1965, through June 30, 1966

PLANT ENGINEERING BRANCH — R. R. Holliday, Branch Chief

I. SUMMARY

During FY 1966 the Plant Engineering Branch stayed abreast of all service demands without increasing numbers of personnel.

The most significant development was the increase in workload for engineering services. Construction performed by private contractors increased about fourfold. This additional load, represented by major improvements and new building construction, placed a heavy burden on the Branch engineering and planning staff.

II. BRANCH PROGRAMS

A. Objectives

The mission of the Plant Engineering Branch is to provide responsive support to the medical research mission of the National Institutes of Health by fulfilling, as expeditiously and as economically as possible, the functions described below.

B. Current Programs

Operation and Maintenance: This function consists of operating and maintaining the NIH physical, mechanical, electrical, architectural, and landscaping facilities.

Engineering: This function consists of developing and preparing plans and specifications for repairs, alterations, and improvements to NIH facilities, administering and inspecting work performed by private contractors, and providing engineering services as required.

Construction: This function consists of providing craft services (station labor) for altering, repairing, and improving NIH facilities.

C. Program Progress and Accomplishments

Construction By Station Shops: Requests for PEB services are received in the form of written work requests and by telephone. Telephone requests for minor services such as clogged plumbing, light bulb replacement, air conditioning malfunctions, and utility leaks are received by three decentralized area maintenance units. All written requests are received by one central work reception office.

An average of 1500 telephone requests are received each week, while written orders average about 360 per week. Almost all telephone requests and about

60 percent of the written orders require little or no formal planning (plans, special material, or detailed estimates of labor). About 1 percent of the written orders, however, require the services of professional engineers for planning, and most of these projects are performed by private contractors rather than by station shops. No additional personnel were employed during the year for station shop activities. An examination of material expenditures for these activities indicates that gross work output remains high. An apparent trend has developed which reflects a decrease in second quarter issues each year. Chart No. I reports material expenditure trends by quarter since 1961.

A good measure of the adequacy or responsiveness of the station shops service is the work in backlog. Experience has shown that an eight-week backlog will allow the most responsive service without sacrificing efficiency. Charts No. II and No. III report the backlog trend for the central craft shops since January 1964. Occupancy of Building 12A beginning in September 1965, and various other factors caused an increase in workload during December, January, and February; otherwise the backlog remained relatively constant, indicating that responsive service was provided.

Construction By Private Contractors: Most large jobs, estimated to require 300 or more manhours, are constructed by private contractors.

Work awarded since FY 1963 has been as follows:

Fiscal Year	No. of Contracts	Dollar Value
1963	271	1,500,000
1964	218	3,016,000 1/
1965	178	2,250,000
1966	130 2/	8,200,000 2/

1/ included new building construction, Bldg. 12A ($1,440,661)
2/ these figures include work awarded through March and estimates of work scheduled to be awarded prior to July 1, 1966, including the NCI Virus Leukemia Building ($3,175,000) and Library and Cafeteria Additions to Building 10 ($2,100,000).

Library and Cafeteria Extension, Clinical Center--In 1961, $335,000 was appropriated for an extension to the Clinical Center Cafeteria facilities. Design on the project was delayed in order to more fully evaluate the effect of changes in the management of patient and employee food facilities. In 1964, an additional $360,000 was appropriated to allow for separation of the two operations. Also in 1964, $900,000 was appropriated for planning and construction of new library facilities, and in 1966, an additional $650,000 was appropriated to allow expansion of the basement and sub-basement areas to absorb certain administrative type functions being displaced by creation of additional patient care area.

Since both Library and Cafeteria Extension were planned as adjacent additions to the south side of the Clinical Center, and since much of the utility work involved was common to both, it was feasible to combine them as a single

NATIONAL INSTITUTES OF HEALTH
Division of Research Services - Plant Engineering Branch

MATERIAL SUMMARY

Quarters (fiscal year)

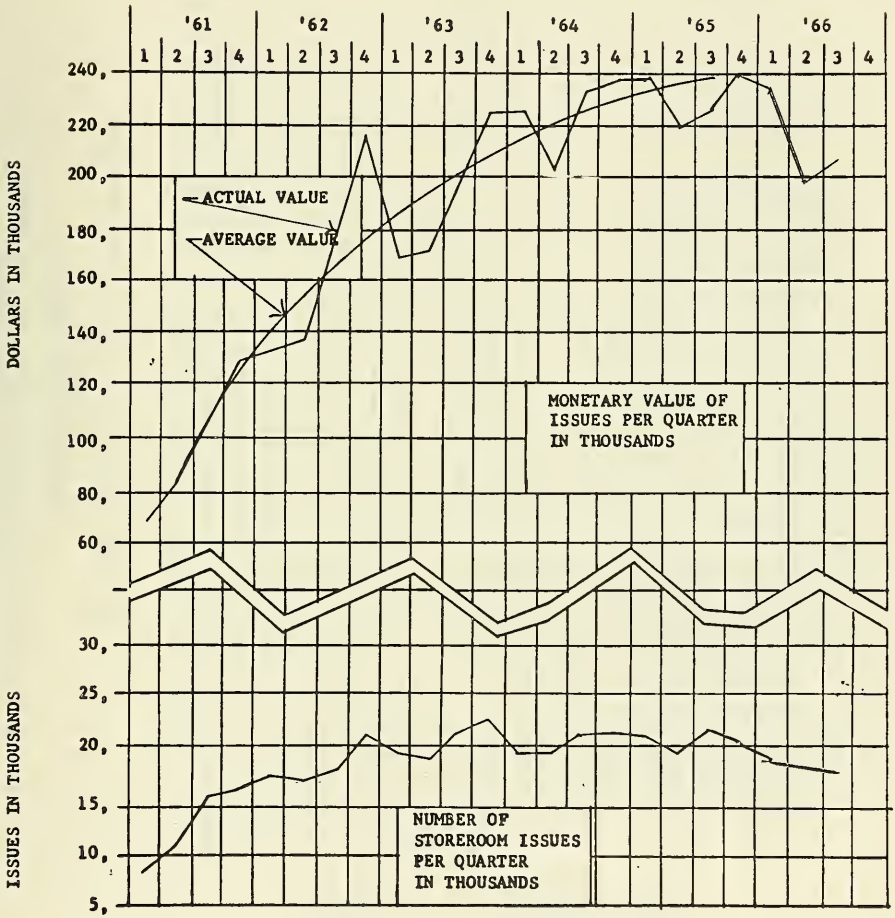


Chart No. I

NATIONAL INSTITUTES OF HEALTH
DIVISION OF RESEARCH SERVICES - PLANT ENGINEERING BRANCH

SHOP WORK BACKLOG SUMMARY

Reporting Period January 1964 thru February 1965

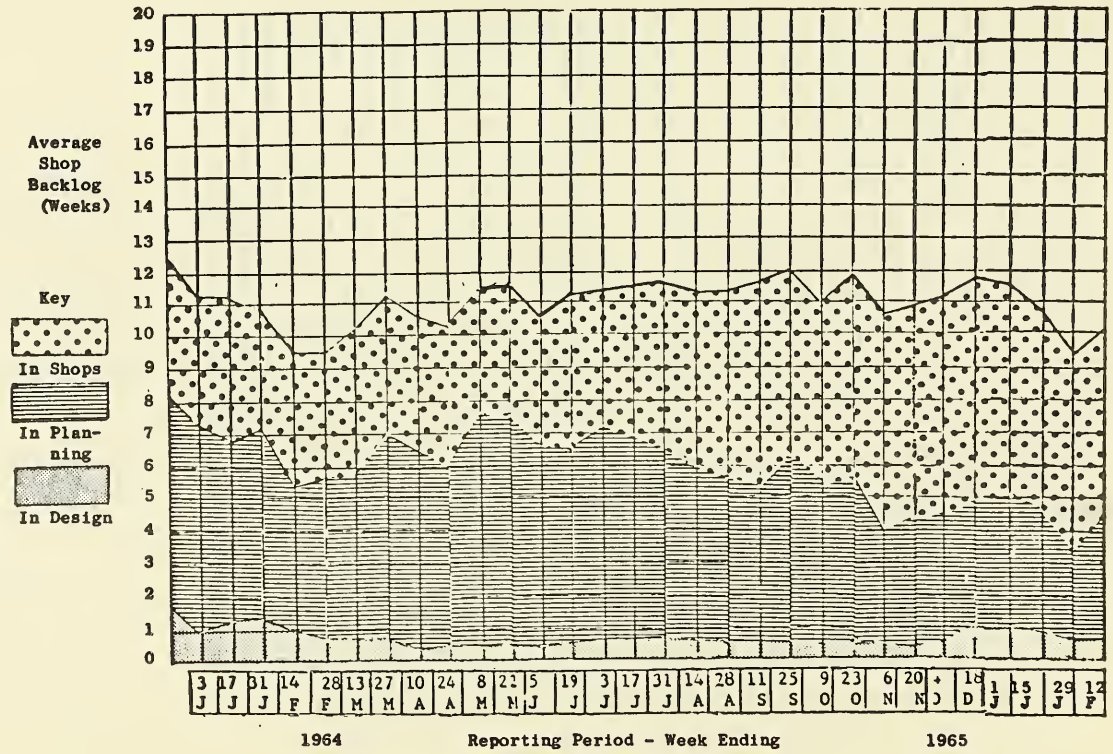


Chart No. II

NATIONAL INSTITUTES OF HEALTH
DIVISION OF RESEARCH SERVICES - PLANT ENGINEERING BRANCH

SHOP WORK BACKLOG SUMMARY

Reporting Period February 1965 thru March 1966

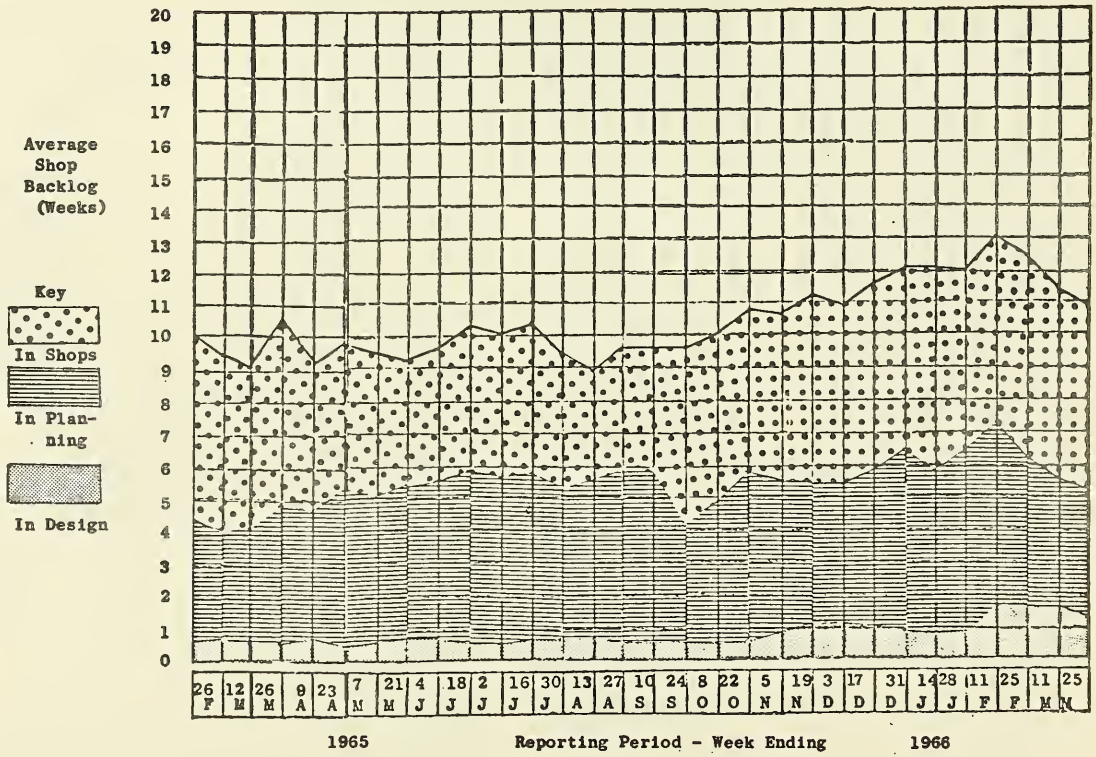


Chart No. III

project having total funds available in the amount of $2,245,000. The A/E contract for design was negotiated in July 1964, design was complete in November 1965, and a construction contract was awarded in April 1966. Construction is scheduled for completion in August 1967.

Wing D Addition, Clinical Center--In 1966, $900,000 was appropriated to expand Clinical Center facilities by adding two floors to the existing Wing D. This project involves removal of the existing sun deck and addition of the two new floors on top of the five currently present. Although this project was program-connected, to an extent, with the basement expansion of the Library, it was deemed more feasible to treat it separately because of the physical dislocation and the variance in the timing of the two.

The POR for this project was completed in November 1965, and an A/E contract for design will be negotiated in June 1966. It is estimated that construction will be complete by May 1968.

NCI Virus Isolation Facility--In 1965, a special appropriation of $10,000,000 was made to the National Cancer Institute to provide for design, mock-up, and testing of virus containment facilities and for construction of an emergency facility on the NIH grounds. Approval was requested for temporary construction authority for this project, and the approval was granted in April 1965. A request for assignment of responsibility for direct control of design and construction was made, and this too was approved in April 1965. Due to the proximity of the end of the fiscal year, no funds for design or construction could be obligated in 1965. By Congressional action, the funds were re-appropriated in 1966.

The POR for this project was completed in September 1965, and an A/E contract for design was negotiated in November 1965. Design will be complete in May 1966, and construction completion is scheduled for early 1968. The estimated cost of construction is $3,175,000.

Alterations For Direct Research Support: An assessment of the trend of this service can be made by comparing, for the past three years, annual expenditures for station labor materials and contract work.

Station Labor Material

FY	Material Expenditures
1963	$437,790
1964	486,180
1965	431,806
1966	515,000 *

Contract Expenditures (Awards)

FY	No. of Contracts	Costs
1963	212	$1,372,325
1964	126	659,458
1965	87	330,794
1966	57	367,677 *

* (projected by extrapolation for 12 months. Actual expenditure for first nine months - Station Labor $386,682 - Contract $190,000.)

From the above data it is evident that the level of services provided by station labor and by contract for alterations in direct support of research will be about the same as in 1965.

Engineering Design Services: During the report period, the professional engineering staff of the Branch prepared plans and specifications for contracted work, plus plans for larger station labor projects. This staff also directed the efforts of professional services contractors engaged by the Branch, and reviewed the work of professional services contractors engaged by others for the design of NIH facilities. A substantial amount of time was spent on this latter category due to the extensive building and utilities program underway.

Horizontal mobility of non-supervisory engineering personnel has been developed by revision of job descriptions which permit an architect or engineer to be transferred temporarily to any Section of the Branch requiring his skills. A result of this mobility is indicated by a 50 percent increase during calendar year 1965 in the man-hours of Engineering Design Section efforts chargeable to "construction time" to give assistance to the Construction Section with large construction projects.

A summary of the work for which design was completed during the report period follows (projected thru June 1966):

Type	Quantity Completed	Actual or Estimated Cost of Construction
Professional Services Contracts	11	$6,232,000.
Staff Design Projects for Contract Work	93	2,158,000.
Staff Design Projects for Shop Work	91	48,000. (Materials only)
Engineering Studies or Surveys	19	
		$8,438,000.

A few of the more important projects in each category are listed below:

Alterations	Actual or Estimated Cost
Construct RIF-Free Chicken Houses, NIHAC	$80,000.
Social Observation Building, NIHAC	75,000.
Locker and Washroom Facilities, Building 1	21,000.
Install 360/30 IBM Computer, Building 12	30,000.
Renovate Computer Space, Building 12	22,000.
Alter Labs on 6th and 7th Floors, Building 10	70,000.
Relocate Viral Oncology Facilities to NIHAC	100,000.
Renovate Dental Clinic, Building 10	50,000.
Plant Maintenance	
Paint Public Areas, Buildings 1, 2, 5, 8, 11, 13, 31	21,000.
Repair Work on Boilers, Building 11	30,000.

Plant Maintenance (continued)	Actual or Estimated Cost
Modernize Motor Control Boards, Buildings 3, 4, 5	$15,000.
Alterations to Elevators, Building 10	40,000.
Roof & Gutter Repairs, Buildings 1-8	30,000.
Correct Exterior Wall Condensation, Building 10A	10,000.
Alter Can Handling Facilities, Building 11A	75,000.
Install Rotoclone System on Incinerator Waste Stack	70,000.

Improvements and New Construction

Library Addition and Cafeteria Extension, Building 10	$2,100,000.
Modify Pneumatic Tube System, Building 10	170,000.
Emergency Virus Isolation Facility	3,175,000.
Fire & Safety Improvements, Bldg. 10 (Phase II)	100,000.
Modify Boilers and Cold Storage Rooms, RML	190,000.
Improve Passenger Elevators, Building 1	225,000.
Convert Building 6 to Central Plant Chilled Water	90,000.
Replace Galvanized Waste Stacks, Building 10	225,000.
Renovate Electrical Distribution System, RML	35,000.

Engineering surveys were conducted to resolve problems of vibration or electrical interference, to assist operational personnel in determining causes of malfunction of equipment, and similar problems. Also, many investigations were made to determine the feasibility, alternatives, and costs of proposed projects.

Procurement Activity: During the first three-quarters of the year, the Shop Stores Unit, PEB, purchased directly 93% of all line items purchased involving 33% of the dollar value. The remaining procurement was made by the Supply Management Branch. Procurement for the first nine months of this year totalled approximately 7000 line items costing $550,000. Total procurement for the year is expected to exceed $1,000,000. This level of activity was about the same as 1965.

Employee-Management Relations: The first agreement involving NIH under Executive Order 10988 was negotiated by the Branch with the Washington Area Metal Trades Council, AFL-CIO. The agreement covers all eligible non-supervisory wage board employees of the Grounds Maintenance & Landscaping Section, PEB.

D. Problems

PEB Material Pre-Packaging Program: During FY 1965, preliminary steps were taken to initiate a material pre-packaging program. Purpose of the program is to reduce the lost time resulting from shop employees having to wait in line at the Shop Stores issue counter when drawing out repair parts and construction materials. The program is set up to operate in the following manner:

1. For the jobs that lend themselves to the procedure, the planner-estimators will plan the work in much greater detail than before and will call out all standard stock material as well as special material.

2. Upon receipt of the orders, the shop planners will designate which items are to be packaged together and pre-issued. Normally the breakdown will be by craft specialization (plumbing, electrical, sheet metal, etc.). In some cases where a particular trade must stop work because of interference with other trades, the material for that trade will be pre-issued in more than one package.

3. The storekeepers will draw the material, package it as indicated by the shop planners, and move it to the special storage area to be held in custody storage. The storekeepers should be able to do this work when there is a lull at the regular issue counter.

4. When production work on the job is scheduled to begin, the craftsmen for each trade will draw out the appropriate package of pre-issued material with a minimum of waiting time.

During FY 1966, an implementation schedule was developed, the basic criteria were established, and several pilot jobs were processed under the procedures. Initially, the program is being limited to pre-selected shop jobs involving over 250 man-hours of station labor. It has been found that additional planning time, averaging about four man-hours per trade specialization (architectural, plumbing, mechanical, electrical, etc.), is required. Within the availability of storage space and other limitations, this program is scheduled to be in full operation by July 1, 1966.

PEB Tool Control Program: In FY 1965, major planning for a formal tool and equipment control program was completed. The toolroom mechanic who will operate the central PEB Toolroom entered on official duty on January 3, 1966. The tool crib area was cleared, and a substantial start was made in inventorying the tools and equipment to be included in the program. Initial requirements for storage cabinets and shelving were determined, and the cabinets and shelves were ordered. A schedule for implementation of the program was developed. Charge-out procedures on a limited basis for the items on inventory were begun on February 11, 1966. Full operation of the system PEB-wide, including the operation of several satellite toolrooms, is scheduled to be in effect July 1, 1967.

Pre-Expended Material Program: The original PEB Shop Stores system made provision for pre-expended, small-value, and non-pilferable materials located in several areas throughout the Branch. The purpose was to reduce waiting time of journeymen at the storeroom issue counter. This activity had been handled informally, and a review indicated the procedures were not very effective.

During FY 1966, steps were taken to modify the procedures so as to make available more useful and popular items located in more suitable locations. The Shop Stores Unit will exercise more management effort to make this program more effective. An implementation schedule was developed to keep the program under continuous attention. Lists of new items to be included were prepared for four stations in Building 13. New storage fixtures (shelving and bins) were ordered, and these stations are scheduled to be in full operation before the end of the fiscal year.

During FY 1967, it is planned to extend the program to such other areas as the Power Plant Unit, the Building Units, and Grounds Maintenance and Landscaping Section, with full implementation scheduled by June 30, 1967.

Uniforms for PEB Wage Board Employees: Over a period of years, the practice had developed whereby work uniforms and laundry service were furnished at government expense to a limited number of PEB employees, mostly in the Grounds Maintenance and Landscaping Section and Clinical Center Unit, Maintenance Engineering Section. During the year, the Washington Area Metal Trades Council, which has been granted formal recognition for PEB wage board employees (except in Grounds Maintenance & Landscaping Section where they have been granted exclusive recognition), requested that all wage board employees be provided with uniforms and laundry service.

Basic authority to provide uniforms and other apparel is covered by Section 509 of the Public Health Service Act which reads, in part, as follows:

> "Section 509. Appropriations for carrying out the purposes of this act shall be available for .....furnishing, repairing, and cleaning such wearing apparel as may be prescribed by the Surgeon General for use by employees in the performance of their official duties ....."

The policy was adopted that all wage board employees would be required to wear suitable clean apparel which will (a) identify the persons as being employees of NIH and PEB and, (b) insure that the employees, who may be subject to contact in varying degrees with infectious or soiled materials, will have an adequate supply of clean clothing available when required. To enforce this requirement on a fair and equitable basis, the uniforms will be furnished and cleaned at government expense.

The initial supply of new uniforms was ordered for issue at the beginning of the warm weather season. They are dark green in color, and many items of clothing are identical to those previously furnished to the Grounds Maintenance personnel.

Recruitment: In July 1965, the Branch had a total of 36 vacancies, and in April 1966, a total of 34 vacancies. During this period, 52 new employees were hired while 50 employees were lost through transfer, retirement, death, etc.

In order to cope with the major NIH expansion (32%) projected for FY 1968, which tentatively is programmed to require 134 additional PEB personnel, it will be necessary to improve both retention and recruitment of personnel. Retention of personnel is greatly affected by the practices of local government agencies in competing for available skilled craftsmen and by the overall supply of skilled craftsmen. The DRS Personnel Officer is aware of certain practices which tend to damage our competitive position, and has already taken action in one area. Additional steps may become necessary.

Retention alone, however, will not result in attracting the large numbers of additional craftsmen which will be needed to provide services for a greatly

expanded National Institutes of Health. It is our intention, therefore, to push vigorously for establishment of an apprenticeship program with the twin goals of expanding the range within which we may recruit and improving the competence and capability of our craft workers.

Training: The Branch supported approximately 567 man-days of formal classroom training for FY 1966. In-service training amounted to 449 man-days, consisting of attendance at the Management Grid Course, Secretarial Workshop course, supervisory courses, and various clerical courses on the Autotutor machine, as well as 270 man-days which were provided within the Branch itself in a thorough course in Refrigeration and Air Conditioning. The remaining 118 man-days consisted of non-government training, with engineers taking a high percentage of these courses.

This type of training has proved its worth and will be continued. However, additional training is still needed both in the "pre-journeyman" stage and in the supervisory areas. It is planned to alleviate the first of these needs by an apprenticeship training program aimed at developing competent workers in each of the trades and crafts. Supervisory training will be provided through the local presentation (by a member of the Plant Engineering Branch) of a course developed by the Civil Service Commission, entitled "Supervision and Group Performance." This is a 40-hour course designed for a class of 16 to 20 participants. The first presentation was scheduled for the week of June 6, 1966, with additional presentations to follow until all PEB supervisors below the level of Section Chief have had the training.

Incinerator Plant Capacity: A study made by the Branch during the year resulted in an estimate that the capacity of the existing plant will be exceeded during 1968-70. The load by 1968-70 is estimated to be about 1000 tons per month. The maximum capacity of the plant is about 850 tons per month. Funds have been included in the FY 1967 budget for planning a new facility. It is estimated, however, that the plant will be overloaded before a new plant is built. If this occurs it will be necessary to segregate refuse and contract with a local municipal plant for disposal.

Steam Generating Plant Capacity: Studies during the year resulted in an estimate that the plant capacity of 300,000 pounds of steam per hour will be exceeded during calendar year 1968 with the additional loads imposed by Buildings 29A, 31C, 35, 36, and 37. To meet this need, an additional boiler is to be installed as part of the overall utility updating (MUE). If the new boiler is not installed before the load exceeds present capacity, the standby boiler will have to be used. With this arrangement, a failure of any boiler would result in the need to cut down on the steam supplied to some areas during peak loads.

NIH Water Supply: Since 1961, the condition of the water supplied by WSSC has deteriorated as a result of the switch-over of the main source of supply from the Patuxent River to the Potomac River. This situation has overloaded water softeners, deionizers, water stills, and related equipment. Efforts are now being made to increase the capacity of this type of equipment, part of which is located in the various laboratory buildings, and the remainder of which is in the central utility plant, Building 11.

Grounds: The extension of the drought through the third year (1962-1965) has had an adverse affect on the condition of the grounds. In addition, the extensive trenching and excavation for new construction and shortage of personnel for maintenance have contributed to the problem. The following steps are being taken to alleviate the situation:

1. Additional personnel have been authorized and employed.

2. All lawn areas are being aerified to a depth of three inches, leaving a pulverized mulch which improves water penetration and reduces run-off during heavy rain.

3. Non-ionic organic wetting agents are being applied to lawn areas to promote water penetration and percolation.

4. Fertilizers and growth inhibitors are being selected to promote root growth and inhibit plant growth to reduce moisture needs and improve plant health.

5. Many trees are being transplanted, grades adjusted, and tree wells and barriers built to protect trees from excavation.

E. Program Plans

Operating Plans: Long- and short-range plans used to direct the day-to-day business of the Branch include: (a) operating budget and related reports; (b) daily reports from the preventive maintenance system as needed to generate the maintenance needs requiring immediate attention, and monthly and annual reports for major repair and improvement program plans; (c) weekly workload reports which reflect the estimated craft labor requirements by trade; (d) monthly workload reports which reflect the estimated engineering manpower requirements for engineering services by discipline; (e) weekly personnel status reports which report the available manpower by organizational unit resulting from personnel attrition and recruitment; and (f) monthly Shop Stores status reports. The Branch developed written step-by-step instructions for the purpose of standardizing the methods and sources of obtaining basic information required in the preparation of all material expenditure and manpower utilization reporting documents.

F. Publications and Patents

None.

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities — July 1, 1965, through June 30, 1966

ENVIRONMENTAL SERVICES BRANCH — Edwin M. Lamphere, Sr San E
Branch Chief

I. SUMMARY

The Branch continued to approach its objective primarily by solving, on a short-term basis, problems brought to it by researchers and others outside the Branch. Visible progress is generally more apparent at the conclusion of long-term projects. However, the researcher's present needs cannot be ignored until major changes are brought into effect. Work on long-term solutions was increased during FY 1966.

To increase management effectiveness, insect and rodent control operations were transferred to Office Services Branch, OAM. This move relieves the Environmental Services Branch of the responsibility of inspecting its own work. It also allows Branch management more time to concentrate on its professional-level activities.

Greatest program progress was made in activities associated with control of biological hazards. In addition to numerous short-term solutions, Building 7 was evaluated with regard to its suitability for hazardous work, and a suite for hazardous work was developed for Building 6.

Quality of the potable water supplied to NIH has resulted in many problems over the past years. In order to arrive at a concerted course of action, a study of the problem on a reservation-wide basis was completed.

The laminar air flow concept developed for industrial clean rooms appears to offer a method for improving control of biological air contamination at NIH. A mock-up operating room using the laminar flow type of ventilation system was constructed so that new ideas may be evaluated.

Air pollution generated by the NIH power plant has been a nuisance problem in the past, and with completion of new construction it would have become a real problem in the technical sense. However, an investigation which defined the scope of the problem was completed and is serving as the basis for decisions on required changes.

With research requiring higher and higher quality animals, factors associated with contamination in production colonies become increasingly important. The Building 14 production areas were surveyed to provide methods for solving potential problems in existing facilities and to provide information for use in the design of new facilities.

II. BRANCH PROGRAMS

A. Objective

The objective of the Environmental Services Branch is to insure that a sanitary and otherwise satisfactory environment is maintained at NIH and its field stations.

B. Current Programs

Attainment of the Branch objective was approached through six closely coordinated functional program areas:

1. Occupational health engineering adapted specifically to the NIH clinical and laboratory research needs

2. Hospital sanitation

3. General sanitation

4. Biological hazard control

5. Water supply--both potable and special purpose

6. Waste disposal--both liquid and solid

Administratively, the Branch approached its objectives by serving as consultant to line management in the Institutes and Divisions. Recognizing that Institute and Division management has a wide variety of problems other than those related to the environment, it is the policy of the Branch to furnish, in addition to a statement of the problems, practical solutions tailored to the individual administrative and technical situation. For problems involving more than one Institute, this approach often leads to development of different solutions for the same problem. However, the results warrant the extra effort.

Most of the Branch workload continued to be of a trouble-shooting nature, whereby an individual problem is investigated and solved at someone's request. However, more time is being spent each year on surveillance activities and on solving problems on a larger-scale basis, which ranges from one wing of a single building to reservation wide.

With regard to the technical approach, occupational health engineering is primarily involved with problems involving air pollution, toxic and noxious fumes, toxic particulates, odors, ultraviolet lighting, illumination, and ventilation.

Hospital sanitation activities are concerned only with the patient-care areas of Building 10, and deal with the infection control aspects of the environment. Routine quarterly surveys are conducted in all operating rooms. Routine monthly surveys are carried out on six of the nursing units where the potential for infection problems are highest.

Approximately half the time devoted to hospital sanitation is spent on various surveillance activities. The other half is spent in dealing with problems of an emergency nature and in developing corrective measures for potential problems.

General sanitation activities are carried out throughout the NIH reservation, NIHAC, and other NIH facilities in nearby areas. During the first part of this year the work followed the past pattern of emphasis on the conventional sanitation aspects of infectious waste disposal, animal rooms, cafeterias, snack bars, vending machines, and housekeeping practices. During the latter part of the year a shift was made toward integrating the general sanitation work with Branch responsibilities in the control of biological hazards. The same areas are covered, however.

NIH central staff aspects of controlling biological hazards were added to the Branch responsibilities in August. This work consists of general surveillance of potentially hazardous areas, special building surveys, development of facilities to provide safe conditions, and general problem solving on request.

Water supply activities are concerned primarily with problems involving the quality of potable and distilled water. In an institution as large as NIH, and with the high quality of water demanded by research work, there is always some type of water problem.

Waste disposal activities involve solid wastes generated by the research laboratories and animal rooms, the NIH sewer system, and the sewage treatment and disposal system at the Animal Center.

C. Program Progress and Accomplishments

Program emphasis within the Branch continually shifts to reflect the changing requirements of the NIH research program and different stages of development of on-going Branch responsibility areas.

Because of the increasing amount of research work involving potentially hazardous microorganisms and the new Branch responsibilities in this area, activities associated with control of biological hazards were given a high priority; and other activities were de-emphasized accordingly. The only 1965 program area to escape the de-emphasis was hospital sanitation, which, as the program is operated, is a biological hazard control effort aimed specifically at the NIH clinical research functions.

Insect and rodent control operations were de-emphasized to the point of requesting that this responsibility be transferred to Office Services Branch, OAM. The Branch program has evolved into what is essentially a professional-level surveillance and problem-solving operation. Good management practice demands that surveillance and the operations which are subject to surveillance should not be located within the same organization. Management efficiency was increased by the transfer, since there is no longer a need for the dual role of managing a professional group with one set of problems and a nonprofessional group with an entirely different set of problems.

Of the remaining Branch programs, lowest priority was given to water supply and to general sanitation. Water supply was selected for a low priority because the NIH problems in this field are rarely of importance to the health of employees or hospital patients. General sanitation received a low priority because the same types of personnel are needed for both general sanitation and biohazards control. While some problems developed during the year as a result of de-emphasizing general sanitation, in the long-range context it will prove to be an advantage. Sufficient time was spent on this activity to avoid any serious problems. In order to attain maximum efficiency, this activity would have had to be eventually reoriented to dovetail with the biohazards activities. This probably can be accomplished much faster in a rebuilding process than by attempting to change the direction of a vigorous on-going program.

While the Branch workload continues to consist mostly of investigating and solving relatively small problems, more and more time each year is spent on long-range solutions. Handling problems on an individual basis will always result in a large workload, since NIH research work can't wait until major changes are brought into effect. However, on an overall basis, short-term solutions result in staying a little behind the problem rather than ahead of it. Visible progress in upgrading the environment generally depends on longer-term efforts.

Long-range solutions include, but are not restricted to, the strictly technical aspects of NIH's environmental problems. Training of laboratory technicians and animal caretakers provides long-range benefits which cannot be achieved in any other way.

Routine surveillance uncovers potential problems before they become actual problems. Special, relatively large-scale surveys allow problems to be solved on an economical large-scale basis. Development of equipment such as special hoods also provides long-range solutions. Industry has proven to be cooperative on this type of development, but industry does not have the close contact with the NIH scientist which is needed to initiate such work.

Routine service-type functions have gradually been transferred to other NIH groups over the years to allow increased emphasis on other aspects of the Branch program. Of the original service functions, little remains but distilled water surveillance. However, this type of work started to increase again in 1966 as a result of biohazards control work. An important aspect of controlling biological hazards is the decontamination of potentially hazardous spaces and equipment. While the vast majority of decontamination is carried out by the individual laboratory, an institution as large as NIH provides enough special work to require that manpower be assigned to it. Provisions were made during the year for (a) converting the large Branch autoclave to ethylene oxide, so that materials which could be hazardous to patients do not have to be taken to the Building 10 autoclave; (b) development of a sealed plastic container for enclosing potentially hazardous equipment prior to decontamination; and (c) collecting a complete kit of materials to be used in either emergency or routine decontamination of laboratories and animal rooms.

The success of any of the environmental control programs is dependent on acceptance by the Institutes. Acceptance of the biohazards program has been excellent. While the Branch cannot take complete credit for this, it can take credit for developing good relations with the Institutes.

At the request of NIAID, a complete evaluation of the suitability of Building 7 for potentially hazardous work was made. ESB has worked on a daily basis with the NCI personnel assigned to the development of the new virus containment building. A complete suite in Building 6, including the development of special animal cages, was worked out to allow virus research activities to continue until the new virus containment building is completed.

Although at the time the new Surgical Wing was completed, its operating rooms were the best in existence with regard to control of air contamination (and still may be), further progress appears possible by use of the laminar air flow concept. The Branch has constructed a mock-up operating room using laminar air flow, and a cooperative project is underway with NINDB to compare the results of the two different types of air supply systems. While the ventilating system in the new Surgical Wing is very good, a quirk in the design allows the system to malfunction on an intermittent basis. The source and results of the malfunctions were determined and remedial action was initiated.

A potential infection problem in the Clinical Center was traced to several patients who were shedding organisms in large quantities. This pinpointing of the problem allowed the necessary control action to be taken.

Air pollution at NIH has been a nuisance and, therefore, somewhat of a problem for several years. However, the steam requirements for new NIH construction have changed the situation into an actual problem for the immediate future. Arrangements were made with the Division of Air Pollution, PHS, for a meteorological study, and this has provided the information on which to base decisions for required changes.

Water supplied to NIH by the Washington Suburban Sanitary Commission has resulted in a large number of problems because of the intermittent high levels of suspended solids. In the past, these problems were treated individually. This year a reservation-wide study of the problem, including economic considerations, was completed. Based on estimates of the problem received from the individual Institutes, it was concluded that re-filtration of all water could not be justified and that greatest possible centralization of water-using equipment would be the most appropriate solution. In this way, adequate filtration could be provided at a cost which is somewhat commensurate with the problem.

To provide information on which to base a contract with the Washington Suburban Sanitary Commission, sewage flows at NIH were measured, and methods were developed for estimating these flows at any stage of NIH's development. While methods for estimating sewage flows from a municipality are well established, these are not even remotely applicable to NIH.

Even excluding germ-free and pathogen-free animals, efforts must be made to provide the researcher with an ever-improving quality of animal. Under these circumstances, environmental considerations become particularly important. A detailed survey of the animal production areas in Building 14 was completed. This provided information necessary to avoid potential problems in existing facilities as well as concepts to be incorporated into the design of future facilities.

D. Problems

Most of the problems encountered during the year resulted from a shortage of trained personnel. Lack of sufficient personnel ceilings during the first part of the year to staff the new biohazards program and, at the same time, carry out essential functions of other programs contributed to the problem but was not the sole cause. Personnel trained in any of the phases of institutional environmental control are in very short supply, and generally it is necessary to recruit personnel who have only the basic background knowledge upon which competence can be built. On-the-job training must be carried out over a period of several months to a year before the new employee becomes fully productive at his grade level.

Aside from the army biological warfare operations, there is almost no other manpower pool from which to recruit personnel for biohazard control activities, and even these personnel would require a considerable amount of reorienting to be useful in the NIH program.

While the field of hospital sanitation is receiving more and more interest at the present time, the hospital sanitarian who is competent to go into a hospital operating room and evaluate the situation does not exist outside of NIH, for all practical purposes. Occupational health engineers who could quickly adapt to NIH needs exist, but government salaries do not compare favorably with those paid by industry.

Fortunately, recent engineering graduates of excellent quality are in plentiful supply through the Commissioned Corps recruiting channels. However, about a year's training is usually required before they become really competent in the health-oriented aspects of engineering needed by the Branch. The engineering career development plan calls for two year assignments.

Plans for improving the situation differ with the various categories, and expected success rates range from very optimistic for the immediate future to fairly optimistic for the distant future. Plans to alleviate the problems in the sanitation aspects of biohazards control consist of in-depth staffing. By combining the activities of the biohazards sanitarians and general sanitation, this can be accomplished. One or two trainees in a group of four or five can be handled easily. This plan is already proving effective.

With regard to engineers, plans are underway to develop an intra-divisional career development plan which will take advantage of training in other Divisions. This has been cleared in principle by the Office of the Chief, DRS.

It is probable that ESB will never be able to justify in-depth staffing in hospital sanitation solely on the basis of the size of that program. However, staff expansion sufficient to provide back-up support in this program may become necessary because of the problems with recruitment of competent hospital sanitation personnel. Because of the present limited staff size, each staff member is responsible for specific areas of the program, and loss of one staff member results in loss of that area of coverage until such time as a replacement can be recruited and trained. Development of hospital sanitation programs in other hospitals is being encouraged with the hope that a manpower pool can be created and used as a recruitment source. However, it will be years before such efforts bear fruit.

E. Program Plans

No change is foreseen in the objectives of the Branch. However, key programs which were de-emphasized during this year will be brought up to last year's level in terms of manpower and hopefully above that point in terms of effectiveness.

In order to staff the biohazards program, personnel were transferred from occupational health engineering and general sanitation. The vacancies created in these areas are now being filled, and, provided that recruiting is successful, water supply and liquid waste disposal will be the only low priority programs at the end of another six months. Highest priority will again be given to the health-related aspects of environmental control, but more work involving control of the environment as it affects the research project appears to be possible.

A small-scale reorganization within the Branch is contemplated during the fall of 1966. All hospital activities, both engineering and sanitation, will be placed in one unit which will be managed by an employee who will have received his Ph.D. in hospital engineering by that time. For a variety of reasons, it is difficult to coordinate the engineering and sanitation aspects of the hospital work when they are in different sections.

In addition, it is planned to consolidate biohazards surveillance activities and general sanitation activities. The two are similar enough that it would be wasteful of manpower to continue to keep them separate. The combination will provide a sufficiently large staff trained in biohazards work to cope with emergencies. The in-depth staffing will minimize the personnel training lag time.

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities July 1, 1965, through June 30, 1966

LIBRARY BRANCH

Jess A. Martin
Branch Chief

I. SUMMARY

The fiscal year covered by this report saw further implementation of the internship, bibliographical services, automation, and workload reporting programs. Equipment lists and specifications were prepared for the new library. Tentative plans were developed for moving personnel, collection, and equipment to the new library building without a major interruption of service. Heavy emphasis was placed on staff training programs during the year.

Changes in the Library's policies and methods of operation made possible a relaxation of some of the regulations that had been developed during the earlier reorganization period. All program changes during the year were again geared to the concept of providing quality service to the research staff of the National Institutes of Health.

II. BRANCH PROGRAMS

A. Objectives

The primary mission of the Library Branch is to operate an efficient, comprehensive library to support the research programs and administration of the NIH Institutes and Divisions. Its activities include the acquisition, processing, maintenance, and circulation of library materials; the operation of a photocopying service; the provision of information, reference, and bibliographical assistance; and the provision of a translating service for foreign scientific literature. To fulfill its mission, the Library must be responsive to the changing literature needs of the NIH investigator and knowledgeable of the current information retrieval, manipulation, and dissemination methods applicable to library procedures and services.

B. Current Programs

Readers Services. Readers services for the NIH staff include reference and bibliographical assistance, circulation and maintenance of literature, photocopying, and translations.

The reference staff compiles short bibliographies on specialized subjects and performs comprehensive literature searching as requested by NIH investigators. The comprehensive literature searching frequently involves the formulation of requests for Medlars by NIH librarians trained at NLM to formulate the requests. In order to answer the multitude of inquiries for specific information, the reference librarians endeavor to keep abreast

of the activities of NIH and other research institutions and of biomedical developments through attendance at lectures, personal reading, and course instruction. In this way they are also prepared to make contributions to the book and journal selections program. As much contact as possible is maintained with the scientist in order to appreciate his specific library needs.

The Circulation Unit, through surveillance and inventory of the collection and its use, maintains the materials in such manner as to encourage greater and easier access for the patron. Extensive use of the photocopy service within the Circulation Unit allows greater and more frequent use to be made of library literature. A considerable activity of this Unit is the interlibrary loan program, which makes available books and journals not found in the NIH Library but required by NIH scientists.

Another important readers' service offered is the translation of scientific literature. Most of the European languages are handled by staff translators. Other languages are translated by contractual arrangements.

Technical Services. Technical services include the acquisition of books, journals, and other printed materials needed to support the research efforts of NIH scientists and the processing of these materials for use. Continual review and revision of the records are needed to remain responsive to the changing needs of the scientists. A gift and exchange program permits valuable materials to be added to the collection at little cost to the Library.

Bibliographical Services. Although the concept of bibliographical support for the scientist through close liaison with the programs of the Institutes was approved in June 1963, this program has only been given gradual implementation. When it is fully implemented, the staff of the Bibliographical Services Section will assume full responsibility for these liaison functions. Also included will be programs of mechanized information handling and coordination with existing programs at the Division of Computer Research and Technology, National Library of Medicine, and other Government agencies.

C. Program Progress and Accomplishments

The second librarian internship program began on August 30, 1965, with the arrival of two interns from the University of Denver Library School and Catholic University Library School. They were given rotating work assignments in all units of the Library. The interns were provided an opportunity to gain work experience in librarianship and information handling while making a substantial contribution to the service program of the NIH Library. Both interns enrolled in the first year of the internship program remained with the Library as reference librarians.

Following completion of an automation feasibility study, it was decided to automate the business-like transactions of the Library Branch. Early in January 1966, a Systems Analyst was employed by the Library Branch to prepare the manual system for automation and design an adaptation of an IBM system prior to its implementation. The system being designed will

not be computer based initially. However, it is being designed with subsequent computer link-up in mind.

The planning phase of the new library facility was completed with the presentation of the final architectural drawings in January 1966. Planning also included the completion of written specifications covering the new equipment for the facility. Tentative plans were drawn for the physical transfer of staff, collection, and equipment. Construction was begun during late spring of 1966. Present plans call for completion of the new extension in August 1967.

An end product workload reporting system was installed in the Library Branch on March 1, 1966. The statistical reporting for the Branch for March was based on the new approach. Under the end product workload reporting system, the average processing time is the estimate for each end product, and the standard man-hours produced in an activity represent the overall estimate for that activity. The end product system can be used when the work processes are recurring and are relatively short-cycled.

Extensive in-house training of the NIH Library staff was conducted during FY 1966. Beginning November 1, 1965, two reference librarians were detailed to the National Library of Medicine's indexing and searching programs for four months. This training prepares reference librarians as formulators of Medlars search requests. On April 1, 1966, a third reference librarian entered the training program.

On November 23, 1965, the first of four in-library training lectures and demonstrations on laboratory techniques was given by an NIH scientist for translators. Subsequent lectures were attended by certain reference librarians. Proposed lectures will cover a wide variety of scientific subjects and will update the translating and reference personnel's familiarity with scientific terminology and research programs.

Phase II of Grid Management was held in the Library Branch from November 1-5, 1965. The Grid Management concept represents a new management technique that is expected to "provide a key for unraveling and solving managerial problems."

An in-house training program was held from December 9-22 for nonprofessional staff members of the Circulation Unit. Two-week exchanges of positions provided four participants the practical experience of performing duties ordinarily assigned to other staff members. It is expected that training of this type will help staff members develop greater overall library competence and will provide greater promotion opportunities for the participants.

Readers Services

Photocopying Service. Two Xerox 914 Photocopiers are used to fill urgent photocopy requests of 20 pages or less. Longer articles are photographed, processed, and then printed by the Xerox Copyflo. A new Recordak Camera, purchased and modified during the year, is used to photograph articles before they are run through the Xerox Copyflo.

Having the new camera enabled the Library to return equipment that had been borrowed from the National Library of Medicine for three years. The coupon identification system introduced in FY 1965 remained in effect during FY 1966.

Circulation. A total of 37,537 books and journals were circulated during FY 1966. This total represents a decrease of 442 volumes since last year. The decrease has resulted from the policy that now prohibits the circulation of materials for which only one copy is owned by the Library. A proportionate increase of photocopies made can also be attributed to this circulation policy.

During FY 1966, 4,666 volumes were loaned to other libraries and 9,736 volumes were borrowed from other libraries throughout the United States for NIH personnel. Translations loaned to libraries totaled 4,465 in FY 1966.

Reference Service. Experienced reference librarians with specialized science backgrounds are a part of the Library staff. Much emphasis is placed on supplying immediate answers to reference questions asked by phone or in person. Reference librarians regularly scan the current scientific literature to keep abreast of trends and developments in the sciences. The book selections program is an important activity shared by the reference librarians and a Selections Review Committee. Included in this program is a continuing search of journals, publishers' catalogs, national book catalogs, and announcements for current in-scope publications needed for the collection.

During the year the Selections Review Committee requested the assistance of scientists at NIH to evaluate the strength of different subject categories of scientific literature within the library collection. It is felt that a more valuable collection will result from the evaluations now being conducted by scientists who know well the subject categories being inspected.

Bibliographies requiring extensive searching were prepared by the Reference Unit on specific subjects requested by NIH investigators as were bibliographies of bibliographies, biobibliographies, and short reference lists. The total number of Medlars searches completed in FY 1966 was 154.

Translating. The NIH Translations Index, Supplement II, 1965 was compiled and distributed widely. The supplement again includes a subject index and a list of journal abbreviations. Each year approximately 500 articles are translated with an estimated 75 of these handled by contractors. Oral translations for the year consumed approximately 940 man-hours. Tape recordings were provided on request.

Technical Services

Acquisitions. During this 12-month reporting period, the Library's collection was strengthened by the addition of 5,247 new books and by

the receipt of 831 books through gift and exchange. For FY 1966, the Library placed subscriptions to more than 2,000 journal titles and received an additional 800 as gifts or on exchange.

In January 1966 the design of the automated system for all acquisitions and recording processes was begun. It is anticipated that the information now recorded on plain 3X5 index cards will be punched on IBM cards shortly after the close of the current fiscal year. A punched card system will allow information requested concerning book purchases to be made available much more quickly than is now the case.

Cataloging. Revision of the Periodical Record preparatory to its automation was completed. Staff shortages necessitated the handling of this project on an overtime basis.

Bibliographical Services

During January 1966, the Chief of the Bibliographical Services Section entered on duty. She became acquainted with the existing manual procedures within the Library Branch in preparation for her role in the design of an automation program. She has recommended alterations in the book selection procedure for the Library and has developed a plan for the systematic evaluation of the quality of the entire book and journal collection. An alerting service introduced by a former Liaison Officer assigned to NIAID was expanded to include not only bibliographies compiled by reference librarians but also pertinent Medlars searches and reprints. User studies are being planned to determine the extent to which certain subject groups of scientists are using the library services and the extent to which their needs are being met.

A proposal for a satellite library for the new Division of Computer Research and Technology was prepared by the Chief of Bibliographical Services at the request of the Chief, Library Branch and the Acting Chief of the new Division. It is expected that this proposal will serve as a prototype for future satellite libraries at NIH.

D. Problems

The recruitment of well-qualified persons for vacancies is difficult. Obstacles are encountered and too much time is spent attempting to employ and bring on board qualified candidates for key positions. Patience usually results in appointments being made but only after some candidates withdraw their names for consideration because of the excessive time factor.

The congested and poorly designed library space still causes the greatest problems. The present library is noisy and hard to supervise, and the security problem is difficult to handle. The majority of these space and security problems will be solved when the new library is completed.

E. Program Plans

Planning the move to new library facilities in the summer of 1967 has high

priority. Detailed specifications, bids, acquisition of new equipment, and plans for moving existing equipment and the library collection will receive additional attention.

Further implementation of the Bibliographical Services Section is planned.

A third medical library internship program conducted by the NIH Library is planned for 1966/67, beginning August 29. The two interns selected for the program will receive practical training at all levels while making contributions to the day-to-day operations of the Library.

The Library staff will continue to work closely with the Systems Analyst during the design phase of an automated system for the repetitive processes of the Library Branch. Implementation of the system will provide staff members an opportunity to develop expertise in programing for and understanding of the computer and its potential value to libraries.

Satellite libraries administratively tied to the NIH Library will be encouraged and developed in the Institutes/Divisions expressing interest in such an arrangement. It is felt that better organization of existing collections and proper development and supervision of new library collections within the Institutes/Divisions will result in more effective use.

F. Publications

Martin, J. A., et al: Twenty-five years of translating service at NIH. Bulletin of the Medical Library Association 53: 422-425, July 1965.

National Institutes of Health Library: NIH Library Booklist. Bethesda, Md., 1965, bimonthly.

National Institutes of Health Library: Periodicals Currently Received in the NIH Library, 1966. U. S. Dept. of Health, Education, and Welfare, Public Health Service Publ. No. 1313. Washington, D. C., U. S. Govt. Print. Off., 1966, 134 pp.

National Institutes of Health Library: Recent Translations, a Selected List. Bethesda, Md., 1966, monthly.

National Institutes of Health Library: Index of Translations, Supplement II. Washington, D. C., U. S. Govt. Print. Off., 1966, 92 pp.

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities July 1, 1965, through June 30, 1966

BIOMEDICAL ENGINEERING AND INSTRUMENTATION BRANCH

Dr. Lester Goodman
Branch Chief

I. SUMMARY

Effectiveness of the Biomedical Engineering and Instrumentation Branch professional and technical support provided to the NIH research program has been significantly increased by (1) an improved organization structure that permits better definition of functions, more efficient management, and enhanced utilization of research and development potential; (2) a distinct elevation in the level of professional staff; (3) the initiation of the "satellite" technical support unit concept; (4) improved workload and financial reporting with extension of automatic data processing; and (5) a vigorous professional and technical training program.

Engineering and technical talent has been better utilized in significant NIH research and development projects. Branch professionals have made extensive contributions to programs involving mechanization, automation, computation, physiological monitoring, artificial organs, surgical procedures, analytical instrumentation, and laser technology.

The technical service sections processed approximately 13,000 assignments, an increase of 11 percent over the preceding fiscal year, with no commensurate increase in staff.

Branch engineers were involved with approximately 400 different research and development projects and recorded more than 400 man-days of professional consultation with the scientific research staff of the Institutes.

The image of Biomedical Engineering and Instrumentation has been significantly enhanced locally within the NIH and broadly throughout the community at large.

II. BRANCH PROGRAMS

A. Objectives

To fulfill the need for engineering knowledge and technical skills in pursuit of health research at NIH.

To provide direct and consultative engineering support to clinical and biomedical research projects, including advice on systems analysis, experimental design, and synthesis of technical expedients.

To design, develop, fabricate, and evaluate special purpose devices and systems not commercially available.

To maintain and repair scientific laboratory and clinical equipment.

To provide communication between NIH and the community on engineering support to clinical and biomedical research.

To serve as a source of informed authority for the community in matters pertaining to technology and health.

B. Current Programs

The primary purpose of the Branch is to provide service and support to the entire intramural program of the NIH. The programs and activities, therefore, are identified with nearly all of the individual programs and activities that constitute the intramural research effort. The overall program is best distinguished by the coordinated effort of its operating units identified and characterized as follows:

1. Instrument Fabrication Section

a. Prepares minor designs of, makes major modifications to, and fabricates biomedical equipment and instrumentation systems.

b. Develops improved production techniques for the complete range of physical materials.

c. Operates facilities for the production of devices requiring special tools and skills in the electronic, electrical, glass, mechanical, optical, rubber, plastics, welding, and sheet metal categories.

2. Systems Maintenance Section

a. Maintains, repairs, and modifies to a limited degree biomedical equipment and instrumentation systems.

b. Instructs technicians and scientists in the proper use and operation of especially complex instruments and devices.

c. Operates facilities for the maintenance and repair of devices requiring special tools and skills in chemical, electrical, electronic, mechanical, and optical categories.

3. Electrical and Electronic Engineering Section

a. Provides direct and consultative electrical and electronic engineering support to clinical and biomedical research projects at the NIH.

b. Designs, develops, and evaluates electrical and electronic instrumentation and equipment used in research and clinical applications.

c. Provides communication between the NIH and the community on electrical and electronic engineering support to clinical and biomedical research.

4. Chemical Engineering Section

a. Provides direct and consultative chemical engineering support to clinical and biomedical research projects at the NIH.

b. Designs, develops, and evaluates chemical instrumentation and equipment used in research and clinical applications.

c. Provides communication between the NIH and the community on chemical engineering support to clinical and biomedical research.

5. Mechanical Engineering Section

a. Provides direct and consultative mechanical engineering support to clinical and biomedical research projects at NIH.

b. Designs, develops, and evaluates mechanical instrumentation and equipment used in research and clinical applications.

c. Provides communication between the NIH and the community on mechanical engineering support to clinical and biomedical research.

6. Branch Engineers

This small group of senior professionals serve as staff consultants in the Office of the Chief and are assigned to organize, conduct, and oversee particular comprehensive, long-range research and development projects. They provide unique scientific and engineering knowledge to the Branch and the NIH.

7. Supply

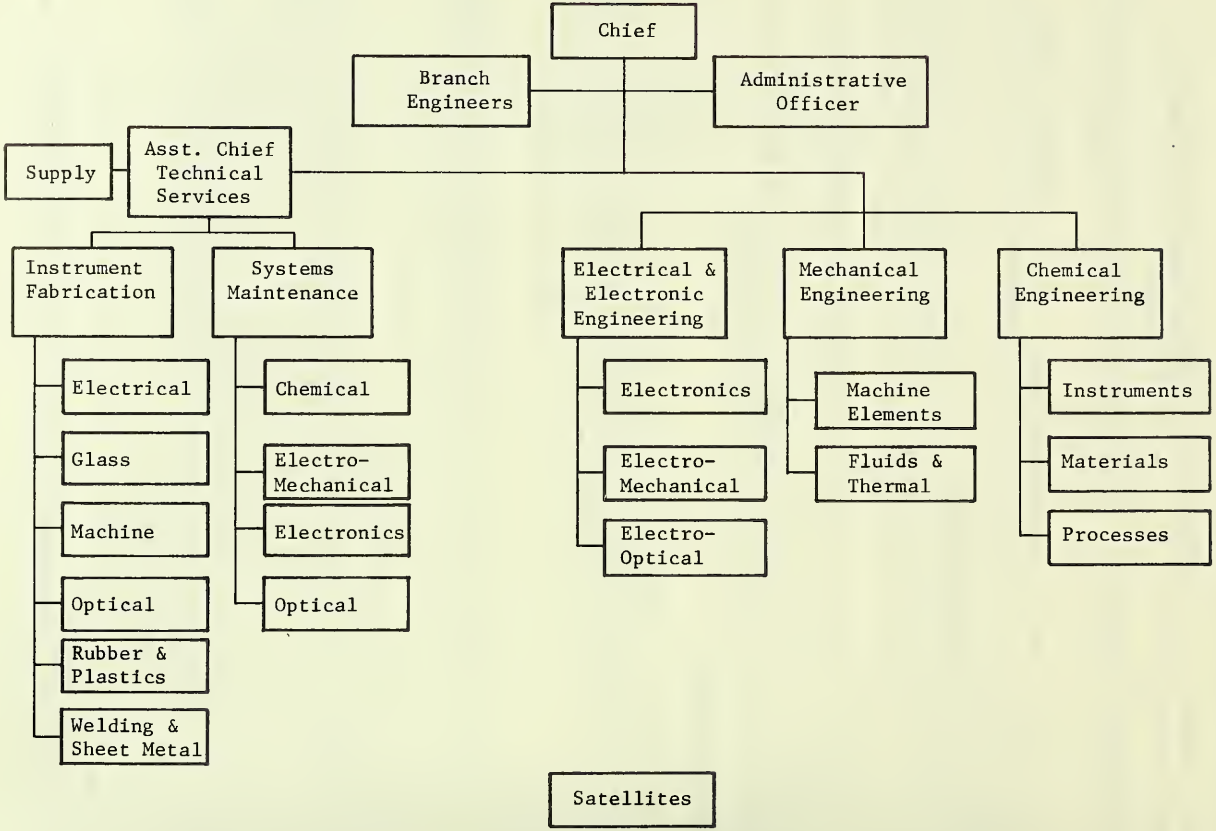
Provides for the acquisition and disposition of materials, parts, and equipment required for Branch operations. Maintains controlled inventory stocks and records.

C. Program Progress and Accomplishments

The effectiveness of professional and technical support by BEIB to the research program of NIH has been significantly increased. These improvements result directly from emphasis on the enhancement of the role of professional physical scientists and engineers as collaborators and prime contributors in health research rather than as subordinate service staff. This emphasis by management is generally acknowledged and supported by the scientific community of NIH. The entire staff of BEIB shares this improved status with the direct results of greater personal pride in the Branch, improved morale, increased productivity, and higher efficiency.

1. Reorganization

The Branch has been restructured as shown by the chart on the following page.



Biomedical Engineering and Instrumentation Branch

The former Engineering Development Section and Electronic Engineering Section are merged into the present Electrical and Electronic Engineering Section to provide better coordination of functions.

The Chemical Engineering Section is newly created in response to demonstrated needs of the research program in keeping with modern trends in the field of biomedical engineering.

The group of Branch Engineers is innovated to provide a means for senior professional staff with certain special knowledge and skills to pursue particular long-range research and development projects free from line responsibility.

The new post of Assistant Chief for Technical Services is primarily charged with the coordination of the Branch activities which fall under the Service and Supply Fund mechanism. These include the Instrument Fabrication and Systems Maintenance Sections together with the Supply Unit. Operating experience under the new organization clearly demonstrates marked improvement.

2. Satellites

The concept of "satellites" of BEIB has been activated. The "satellite" is a semi-autonomous technical support unit composed of engineers, technicians, and shop facilities located remotely from the central Branch. The satellite system places technical resources at close hand to the scientific staff. The group is immediately responsive to particular on-site program needs but is administratively responsible to BEIB management. The central Branch provides overall coordination and technical guidance to the satellite personnel, who are intimately familiar with the particular problems and personnel in their area. A full satellite is now in successful operation in the Clinical Center. Expansion of similar groups in NIDR and NCI is contemplated at an early date.

Plans for the Gerontology Branch, NICHD, in Baltimore and for the new NICHD construction in Bethesda include provision for satellites. The explicit mechanism for financing satellite operations remains undefined.

3. Space

A serious problem regarding adequate space for central Branch operations in Building 13 continues to exist. The situation is especially critical for the Systems Maintenance Section Shop and for the engineering staff. Overcrowding in these areas has reached the point of hazard, even though the number of personnel is significantly below current ceilings and expectations for the near future. It is anticipated that an expansion of about 5600 sq. ft. early in FY 1967 will alleviate the situation to a considerable extent. Plans have been completed for the expansion, and negotiations are under way.

A relatively minor expansion and alteration of the welding shop in the Instrument Fabrication area relieved an especially hazardous situation and improved the capability of the welding and sheet metal unit to process large structures.

4. Workload

The IFS processed approximately 4,300 different project assignments involving minor design, fabrication, or major modification. The SMS processed approximately 8,800 different project assignments involving maintenance, repair, or minor modification. The total, 13,100, represents approximately an 11 percent increase over FY 1965, with no commensurate increase in staff.

BEIB engineers were involved with approximately 400 different research and development projects and recorded over 400 man-days of professional consultation on a casual basis. A significant increase in the number of comprehensive long-range projects with which the Branch is involved is noted as an important characteristic of the evolution of the role of BEIB in the NIH program. Individual projects of special interest are detailed in section III below. Particular attention is called to significant contributions currently being made in the following:

a. Improvement in performance and utility of the physiological monitoring and display system in the surgical wing of the Clinical Center.

b. Systems design and construction for mechanization and automation of laboratory and clinical procedures.

c. Research and development in artificial organs and prostheses including studies of basic phenomena and construction of devices for artificial heart components and hemodyalysis therapy.

d. Systems design and construction of devices to gain more benefits from automatic data processing and electronic computation and control.

e. Improved methods and tools for cardiac and neurosurgery.

f. The development of the laser as a useful device in life science research and therapy, as well as extension of its physical potential.

g. The development of a surface tension apparatus. This project applies feedback control to surface tension measurements made with a Langmuir trough to study the effect of various chemical constituencies on the properties of surface films. Two modes of operation are possible: constant area with tension recorded as a function of time, or constant tension with area recorded as a function of time. The system permits automatic measurement of the surface tension of a film which is involved in a chemical reaction, with a high degree of accuracy and convenience.

It is important to note that these accomplishments are not the sole products of the professional staff of BEIB. They represent the collaborative effort of the scientific staff of the NIH together with BEIB's engineers. Further, they would not exist were it not for the full participation and superior skills of the technical service sections.

Significant improvements in workload reporting have been accomplished. All operating units of the Branch now are included in a uniform manner. The instrument is not yet completely satisfactory but is evolving as time and experience accrue. The more comprehensive methods provide important information, heretofore unobtainable, for improved operations analysis and forecasting.

5. Engineering Advances

BEIB has designed and developed a considerable number of special purpose devices in support of Institute research projects. Unique items, of more than casual interest, are identified as follows:

A special low noise thermocouple amplifier measures temperature changes in the heart during a cycle of operation.

A projector timer permits programing of two projection intervals over a 12-event sequence of a neurological operation. It includes stimulus triggers and event mark voltages for analog recording.

A 24-channel analog temperature recording system is used in low temperature neurological temperature gradient studies.

A radio frequency excited gas ionization apparatus removes organic material from bone samples without destroying the crystalline structure.

A solid state precision temperature control system is used in a bench-type centrifuge.

An automatic serial diluting machine provides for rapid sterilization of the lips of glass tubes and subsequent injection of media or reagents into tubes arranged in racks of 64 each to reduce manual handling. A conveyor system sequentially transfers the racks to individual treatment stations where 16 tubes in a single row are treated simultaneously.

A blood vessel stapling machine staples fascia into artificial arteries for humans. Staples 0.1" long made of 0.01" diameter tantalum wire and formed to prevent complete closing, avoid tissue damage.

A dual stepping motor assembly controls wavelength and slit width of a monochromator. Motor drive is electronically controlled by outputs from a LINC computer. A log ratio converter accepts inputs from a reference and a signal photomultiplier tube and provides a suitably conditioned signal to the LINC computer.

A random pulse generator drives a photic stimulator, part of a response averaging instrumentation system. An aperiodic stimulation is required to preclude the subject's anticipating the stimulus.

An electronic automatic scoring board scores the patient during psychophysiological testing, reducing the time required to check the test results and increasing their accuracy.

A glass knife scoring device holds and scores a sheet of glass to permit controlled manufacture of microtome knives.

A special purpose analog computer for cardiac surgery permits on-line and off-line computation of various cardiac functions observed during open heart surgery.

A digital processing unit performs threshold detection, base line stabilization, and peak detection. The unit employs a unique microcircuit bidirectional counter and has been integrated with a chromatograph data acquisition system.

A fully automated dynamic surface tension measuring apparatus features constant force or constant.area operating modes.

A special purpose computer determines the average resting potential of neurons as they are pierced by the insertion of a microelectrode in the brain.

A digital data acquisition system expedites protein diffraction studies.

An electronic control unit controls a vacuum heart booster and synchronizes it with the electrocardiogram.

Electronic circuitry to permit remote monitoring of an electromagnetic blood flowmeter has been installed in the cardiac surgery.

A special microelectrode recording console handles a multiplicity of EEG channels in the neurology operating room.

A photocopy device for use of the NIH Library produces rapid microfilm copy from books and bound volumes of journals. Semiautomatic and self-adjusting, it accepts volumes of random size, thickness, and page progression.

An acid analyzer high-pressure manifold withstands pressures up to 400 psi and provides considerable utility for programing analyzers for automatic multiple runs.

A spectrophotometer power supply is being substituted for storage batteries in equipment used for visible wavelength spectrophotometry. Two hundred units have been installed at a savings of $463 per unit, with a net savings of $92,600.

An ultracentrifuge vacuum detector has been modified to shut down the ultracentrifuge when there is a loss of vacuum. Inadequate vacuum causes excessive rotor heating and destroys samples.

A high-speed, low noise pH meter permits monitoring of fast enzyme reactions.

A multiple filter holder provides a six-fold increase in the rate with which samples of labelled proteins and polynucleotides are prepared for analysis.

An angulated implant electrode hydraulic microdrive can be so positioned as to penetrate any point beneath the skull, and the point of penetration can be accurately known by means of calibrations on an adapter.

An automated ergograph provides electro-pneumatically programmed forces to a squeeze grip operated by a monkey. One hundred force levels, within the range of 0 to 15 pounds, are produced, depending upon the monkey's success at closure. Digital and analog readouts are available for eventual automatic computer processing of data records to expedite psychophysiological studies.

6. Inventory

Improvements in inventory control with more use of automatic data processing have been achieved. An economic order quantity system is in development.

7. Service Contracts

The Branch encourages the use of contractual services with special emphasis on service-type contracts with certain scientific equipment suppliers. For the past two years, a fixed price contract with Beckman Corporation, Spinco Division, has proven most beneficial to the scientific staff. Specific benefits derived include:

a. Consulting services on custom engineering modifications and special accessories.

b. Providing information for researchers and technicians on new techniques and applications as developed.

c. Direct liaison with NIH researchers and Branch personnel with the research, application, engineering, and marketing departments.

d. Guidance and assistance in setting up scheduled service and maintenance programs.

A training seminar was conducted by Beckman in January and February on molecular weight determinations through the use of ultracentrifugation. Four one-week classes were held, with a total of 56 researchers participating. Ninety applications were received, but because of lack of space and time, the entire group could not be accommodated.

Negotiations for an additional similar contract with the Beckman Special Process Instrument Division is under way for spectrophotometers, pH meters, and gas chromatographic and liquid scintillator counters.

8. Utilization of Scientific Equipment

An acceptable overall economic equipment utilization program for NIH is sorely needed. The Branch maintains a small informal loan program initiated a year ago. The turnover value of equipment loaned to NIH researchers this year was $120,000 compared to $50,000 for the previous year. In addition, the Branch

intends to initiate an inspection program, in cooperation with SMB, concerned with serviceability, utility, and condition of all scientific equipment passing through surplus property.

9. Service and Supply Fund Operations Report

An improved data processing reporting system was programmed during the year. This new system has improved our transactions with the Institutes by providing them with timely, up-to-date reports of costs of projects completed and in process.

A marked reduction of paper work and time delay was achieved for maintenance and repair tasks by establishing a basic monthly obligation under a single assigned allotment number and project number for each program. Similarly, savings have been achieved by increasing authority for processing of fabrication tasks to $200 without requiring formal administrative clearance.

10. Training

A vigorous professional and technical training program is emphasized to provide improved, up-to-date support to NIH in engineering, fabrication, and maintenance. Twenty-six employees participated in academic and technical courses. Sixteen (215 man-days) attended formal education and training courses. Fifteen (120 man-days) received specialized training on scientific equipment at suppliers' plants and at the NIH.

D. Problems

1. Technical Personnel

The abolishment of the Instrument Making Series by the Civil Service Commission has created difficulties in the SMS. A large number of the personnel have been reclassified in Wage Board positions under the title of Medical Equipment Repairers. Since no open examinations exist at present, recruiting and retention in this area is difficult, with most new appointees receiving taper appointments. It appears that January 1967 will be the earliest date examinations will be announced, if at all, because of consolidation of the Civil Service Examining Boards. The Personnel Management Branch is seeking means by which career conversions can be realized and other recruitment sources exploited.

2. Professional Personnel

It remains difficult to recruit and retain the type of high level professionals required to meet current demands and to be prepared for future expansion of the NIH program. Salaries and advancement opportunities at the lower grades for recent baccalaureates remain slightly lower than equivalent opportunities in industry. Beginning salaries are on the order of 5 to 10 percent low. The disparity increases progressively as grade levels increase, so that at the upper grades of GS-13, 14, and 15, industry and academic institutions

offer up to 50 percent more than Civil Service. In addition, advancement opportunities are severely limited at the upper grades. The problem is aggravated by the fact that other Government agencies and even other divisions within NIH are able to offer higher compensation than can DRS. It has been recognized by higher authority that a more liberal policy is essential; however, substantive progress seems to be very slow in appearing.

Modernization of the traditional policies of the Civil Service Commission and personnel officers with regard to all personnel actions would seem appropriate in this era of rapid growth and change. Major modifications are essential if the full potential for contribution is to be realized.

3. Space

The problem of inadequate space for the central Branch in Building 13 appears to be on the way to partial solution in FY 1967, since plans for expansion have been initiated. At the anticipated rate of growth, further enlargement will be required two to four years hence.

As the satellite concept becomes more fully developed, provisions for more adequate space will probably be required in the Clinical Center, Building 30, and Building 6.

Should an overall economic equipment utilization program be developed for all of NIH, more space will be required in Building 13.

4. Large-scale Development Programs

Concern is expressed over the proper allocation and management of engineering and technical responsibilities vis-a-vis large-scale development programs such as the Artificial Heart Systems Development Program and the Artificial Kidney-Hemodyalysis Program. It is hoped that NIH will fulfill its technological responsibilities for these programs as well as the medical aspects for which it is uniquely qualified.

5. Program Conflicts

The demand for close engineering and technical support in the performance of health research is growing very rapidly. A result is conflict over the degree to which identification and decentralization of support facilities are desirable. There are advantages to each Institute/Division having its own captive technical support team. There are advantages in having a single comprehensive central organization. Multiplication of facilities and functions can be extremely inefficient. Great care must be taken in seeking to achieve the most effective distribution of facilities and personnel. This is especially important where personnel, physical, and financial resources are limited.

E. Program Plans

As indicated in the preceding sections, the Branch has initiated a number of far-reaching programs and has identified a number of deep-rooted significant

problems. Explicit plans for the immediate future are restricted to the rapid enhancement of established programs and aggressive pursuit of solutions to the problems stated. An important consideration in this regard includes an anticipated growth rate of 15 percent per year, together with the observation that the professional and technical resources of BEIB are not adequate to meet current demands in an adequate fashion.

F. Publications, Presentations, Patents, and Awards

1. Publications

Alt, F., Harlow, W. G., and Metz, H. D.: Biomechanical instrumentation engineering. In "Biomechanics and Related Bio-engineering Topics," Proceedings of a symposium held in Glasgow, September 1964. New York, N. Y., Pergamon Press, 1965, pp. 9-19. (Note: Dr. Alt and Mr. Harlow are no longer with NIH.)

Cohen, G. S.: An instrumentation system for surgical neurology. In Iwai, Y. (Ed.): Digest of the 6th International Conference on Medical Electronics and Biological Engineering, August 22-27, 1965, Tokyo, Japan, pp. 364-365. (Japan Society of Medical Electronics and Biological Engineering) (Presented in Tokyo, Japan, Aug. 1965.)

_____: Design of the operating room. In Segal, Bernard L. (Ed.): Engineering in the Practice of Medicine. Baltimore, Md., Williams and Wilkins Publishing Co. To be published spring of 1966. (Presented at the "Engineering in the Practice of Medicine" meeting sponsored by the Dept. of Medicine of the Hahnemann Medical College and Hospital and the Group for Engineering in Medicine and Biology of the Philadelphia Section of IEEE, Philadelphia, Pa., Nov. 1965.)

Friauf, W. S.: Uses of integrated circuits in biomedical engineering.
Harlow, W. G.: An automatic microtitration system for viral serological investigations.
Metz, H. D.: The design of an artificial kidney center.
Riggle, G. C., Anderson, F. O., and Chalifoux, H. D.: The tetrascanner: a new device for detecting brain tumors. In Frommer, P. L. and Vurek, G. G. (Eds.): Proceedings of the 18th Annual Conference on Engineering in Medicine and Biology 1965. Philadelphia, Pa., The Conference Committee for the 18th Annual Conference on Engineering in Medicine and Biology, Herman P. Schwan, Chairman, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Pa., 1965, Vol. 7, pp. 216, 181, 50, 13, respectively. (Papers presented in Philadelphia, Pa., Nov. 1965.)

Goodman, L.: Biomedical engineering and instrumentation. Paper No. 66-MD-5. The American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N. Y. 10017 (Presented at the ASME Design Engineering Conference, Chicago, Ill., May 1966.)

2. Presentations

Cohen, G. S.: Biomedical engineering and instrumentation branch support. Chesapeake Area of Hospital Engineers, Bethesda, Md., March 1966.

_____ and Goodman, L.: Engineering in medicine. Delaware Hospital Association, Wilmington, Del., Jan. 1966.

Goodman, L.: Engineering in medicine. Potomac Chapter, Maryland Society of Engineers, Langley Park, Md., Nov. 1965.

_____: Biomedical engineering at the National Institutes of Health. University of New Hampshire, Durham, N. H., March 1966.

_____: Federal support in biomechanics. Panel presentation. First ASME Human Factors Conference, Washington, D. C., March 1966.

_____: Biomedical engineering and instrumentation at the National Institutes of Health. Instrument Society of America, Philadelphia Section, Philadelphia, Pa., May 1966.

Simon, G. A.: Illustrated lecture describing the role of BEIB in the mission of NIH. One of a series of orientation lectures for PHS Commissioned Officers at the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, Aug. 1965.

3. Patents

Metz, H. D.: Microtome section pickup and manipulator. Notice of Allowance and Issue Fee dated April 6, 1966.

Leder, P. and Byrne, C. J.: (Patent applied for) Multiple Filtration Apparatus, patent application 404-993, filed October 19, 1964.

4. Awards

Mr. John M. F. DeBroske received a cash award for "Superior Performance by serving in dual capacity as Chief, Instrument Fabrication Section, and full assistant to the Acting Chief on day-to-day operations and overall administration of the Biomedical Engineering and Instrumentation Branch." December 1965.

Mr. Walter S. Friauf received a quality increase for his level of proficiency in solid state circuit design. January 1966.

Mr. William H. Schuette received a quality increase for his exceptional ingenuity and productivity in developing devices and systems used in NIH laboratories and clinics. May 1966.

Serial No. DRS-BEIB-1 (c)

1. Biomedical Engineering and Instrumentation Branch
2. Mechanical Engineering Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: Artificial Kidney Center

Previous Serial Number: None

Principal Investigators: E. A. Gombos, Howard D. Metz

Other Investigator: Homer D. Chalifoux

Cooperating Unit: Nephrology Laboratory, Veterans Administration Hospital

Man-years:

Total:	1.75
Professional:	1.0
Others:	.75

Project Description:

Objective: To develop and equip a hemodyalysis treatment center serving 10 patients simultaneously.

The center is nearing completion at the Veterans Administration Hospital in Washington, D. C. It includes a central dialysate preparation system which feeds individual Kiel membrane bedside units. The central system prepares, monitors, and pumps dialysate to each bedside kidney. Temperatures, pressures, and flow rates are monitored and regulated at the bedside for each patient. Safety devices within the central system assure proper concentration and temperature, or, in case of malfunction, stop the dialysate flow, signal an alarm, and indicate the cause. To prevent bacterial growth, the system incorporates means for automatic cleaning and sterilizing.

Publication:

Metz, H. D.: The design of an artificial kidney center. In Frommer, P. L. and Vurek, G. G. (Eds.): Proceedings of the 18th Annual Conference on Engineering in Medicine and Biology 1965. Philadelphia, Pa., The Conference Committee for the 18th Annual Conference on Engineering in Medicine and Biology, Herman P. Schwan, Philadelphia, Pa., 1965, Vol. 7, p. 50.

Serial No. DRS-BEIB-2

1. Biomedical Engineering and Instrumentation Branch
2. Mechanical Engineering Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: Automatic Microtitration Study

Previous Serial Number: None

Principal Investigators: Winton G. Harlow (no longer at NIH)
George A. Simon

Other Investigator: George L. Lawrence

Cooperating Unit: Perinatal Research Branch, NINDB

Man-years:

Total:	2.0
Professional:	1.5
Others:	.5

Project Description:

Objective: To achieve an integrated, automated system for bulk processing of microtitration work. The study consists of four main projects, as follows:

1. A diluting machine for automatically performing accurate serial dilutions in rows of microtitration cups.

2. An injection machine for preparation of microtitration cups, in which accurately measured droplets of reagent are rapidly injected into sets of cups.

3. An injection machine for mass preparation of racks of test tubes. Each tube is flame-sterilized before and after injection of measured quantities of nutrient media.

4. A data-taking, readout device to evaluate the amount of precipitate formed in the bottom of titration cups. An optical system capable of measuring the quantity of hemoglobin precipitated from lysed blood cells.

These studies have included experimental optical systems, high-speed photography studies of droplet formation at jet orifices, transfer of precise quantities of liquids by means of wire loops, and maintenance of sterility by various sealing materials.

Publication:

Harlow, W. G.: An automatic microtitration system for viral serological investigations. In Frommer, P. L. and Vurek, G. G. (Eds.): Proceedings of the 18th Annual Conference on Engineering in Medicine and Biology 1965. Philadelphia, Pa., The Conference Committee for the 18th Annual Conference on Engineering in Medicine and Biology, Herman P. Schwan, Philadelphia, Pa., 1965, Vol. 7, p. 181.

Serial No. DRS-BEIB-3

1. Biomedical Engineering and Instrumentation Branch
2. Mechanical Engineering Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: Heart Assist Pump

Previous Serial Number: None

Principal Investigators: Howard D. Metz, William S. Pierce

Other Investigators: John W. Boretos, John L. Fogle

Cooperating Unit: Surgery Branch, NHI

Man-years:

Total:	1.25
Professional:	1.0
Others:	.25

Project Description:

Objective: To construct a roller-type pump which can be placed in the human body as a permanent left ventricular heart-assist for patients requiring such partial relief. The current phase of this project is primarily concerned with engineering design and materials.

Methods Employed: The project is divided into three parts:

1. The development of a reliable, electrically powered implantable pump of an acceptable size, made of physiologically compatible materials, capable of handling the required blood flow rates.

2. The development of physiologically acceptable internal tubing material capable of withstanding long-term mechanical stresses for at least two years to failure.

3. The development of a measurement and control system to maintain correct pressure within the left atrium of the heart.

During the approximately one and one-fourth man-years devoted to this project thus far, one roller-type tester has been built. Information gained from this has led to the construction of a first prototype pump. Approximately two dozen types of tubing have been procured, or fabricated, and tested. First results indicate that a new properly balanced formulation of ethylene propylen terpolymer elastomer may be acceptable.

Serial No. DRS-BEIB-4

1. Biomedical Engineering and Instrumentation Branch
2. Mechanical Engineering Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: Shock Damage Instrumentation

Previous Serial Number: None

Principal Investigators: Winton G. Harlow (no longer at NIH)
Ayub K. Ommaya

Other Investigators: George F. Norris, George A. Simon

Cooperating Unit: Surgical Neurology Branch, NINDB

Man-years:

Total:	1.0
Professional:	.75
Others:	.25

Project Description:

Objective: To provide means for acquiring quantitative measures of shock damage to nerve tissue through studies of injuries to the head and spinal column caused by whiplash.

Methods Employed: The Head Injury Study concerns shock damage to cranial tissue. Controlled mechanical shocks are administered to selected spots on the head of a test monkey by means of a bumper driven by an air cylinder. A restraint is provided by a bucket seat mounted on a universal pivoting system. Data are gathered by appropriate transducers and high-speed photography.

The Whiplash Study evaluates the effects of sudden accelerations on the upper portion of the spinal column. A restraint device has been adapted to a vehicle which travels along a 12-foot track at selected and controllable accelerations. Transducers attached to the vehicle and the test animal monitor forces, accelerations, and pressures. High-speed photography provides a permanent record of whiplash curves of the spinal column which can be related to subsequent clinical records.

Serial No. DRS-BEIB-5

1. Biomedical Engineering and Instrumentation Branch
2. Office of the Chief
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: Utility of the Laser in Biological Research and Clinical Applications

Previous Serial Number: None

Principal Investigators: Grant C. Riggle, Alfred S. Ketcham

Other Investigators: Woodrow F. Stotler, Robert C. Hoye

Cooperating Unit: Surgery Branch, NCI

Man-years:

Total:	1.5
Professional:	.75
Others:	.75

Project Description:

Objective: To quantify the effects of laser energy as a surgical and experimental tool in several fields of medicine, including cancer and neurology.

Methods Employed: Utilize available commercial lasers; develop special units incorporating frequency multiplication; perform comparative studies on experimental animals to determine manifestations of various laser energy levels; develop instrumentation for control and measurement of laser performance.

Major Findings: Since program was newly initiated this fiscal year, it is too early to state definitive results.

Significance to Biomedical Research and the Program of the Institute: The potential benefits of a new type of energy for certain types of medical applications. The need for more complete understanding of the properties of laser power, its measurement and control.

Proposed Course of Project:

1. Development of accurate and precise methods for controlling and measuring laser energy. Corresponding development of new instrumentation which may not be commercially available.

2. Study of effects of various laser light parameters on tissue, such as frequency pulse width, height, waveforms, and optical patterns. Selection of optical materials for particular purposes.

3. Development and test of materials and operations standards for personnel safety.

Serial No. DRS-BEIB-6

1. Biomedical Engineering and Instrumentation Branch
2. Office of the Chief
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: Automated Sample Combustion Development

Previous Serial Number: None

Principal Investigators: John I. Peterson, Seymour M. Perry

Other Investigator: Sidney Siegel

Cooperating Unit: Medicine Branch, NCI

Man-years:

Total:	.1
Professional:	.1
Others:	

Project Description:

Objective: Automation of the combustion technique for preparation of samples for radiotracer scintillation analysis.

Methods Employed: Experimental combustion techniques.

Major Findings: None to date.

Significance to Biomedical Research and the Program of the Institute: This development would reduce the cost and labor involved in the preparation of large numbers of samples.

Proposed Course of Project: The feasibility of a continuous flow combustion will be tested.

Serial No. DRS-BEIB-7 (c)
1. Biomedical Engineering and Instrumentation Branch
2. Office of the Chief
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: Automated Urinalysis Development

Previous Serial Number: None

Principal Investigators: John I. Peterson, Donald Young

Other Investigators: None

Cooperating Unit: Clinical Pathology Department, CC

Man-years:

Total: .3
Professional: .3
Others:

Project Description:

Objective: The development of methods and instrumentation to provide automatic analysis of urine samples, in a continuous operation, for several components of clinical significance.

Methods Employed: Mechanical engineering design and analytical methodology appropriate to the determinations of interest; namely, color, pH, specific gravity, glucose, hemoglobin, protein, ketones, bilirubin and urobilinogen.

Major Findings: None to date.

Significance to Biomedical Research and the Program of the Institute: The development of this equipment will facilitate screening of patients' urine on a routine basis, will provide better data than is available by dipstick tests, and will allow laboratory personnel to be freed from routine work for assignment to other development programs.

Proposed Course of Project: Concurrent development of mechanical handling techniques and adaptation and testing of analytical methods.

Serial No. DRS-BEIB-8 (c)
1. Biomedical Engineering and Instrumentation Branch
2. Office of the Chief
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: Microbiology Automation

Previous Serial Number: None

Principal Investigators: John I. Peterson, Viola Mae Young

Other Investigators: None

Cooperating Unit: Clinical Pathology Department, CC

Man-years:

Total:	.1
Professional:	.1
Others:	

Project Description:

Objective: Development of a program for the automation of various aspects of clinical microbiology.

Methods Employed: Discussions between the Microbiology Service and BEIB personnel, to develop proposals for the program.

Major Findings: None to date.

Significance to Biomedical Research and the Program of the Institute: Automation of microbiology operation is aimed toward minimizing the labor and time delay involved in providing microbiological data which is critical to patients' therapy.

Proposed Course of Project: The development of primarily mechanical handling systems.

Serial No. DRS-BEIB-9

1. Biomedical Engineering and Instrumentation Branch
2. Office of the Chief
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: Prevention of Thrombosis on Intravascular Prostheses

Previous Serial Number: None

Principal Investigators: John I. Peterson, Nina Starr Braunwald

Other Investigator: Lawrence I. Bonchek

Cooperating Unit: Surgery Branch, NHI

Man-years:

Total:	.2
Professional:	.2
Others:	

Project Description:

Objective: To solve the problem of clot formation on implanted intravascular prostheses.

Methods Employed: The hypothesis, that coagulation can be prevented by an appropriate electrical charge applied to the prostheses, is being tested.

Major Findings: None to date.

Significance to Biomedical Research and the Program of the Institute: The coagulation problem is presently the greatest obstaclé to successful use of implanted valves. The solution of this problem is a basic requirement of artificial heart development.

Proposed Course of Project: Electrical measurements are being made to establish the conditions which will prevent coagulation on test wires implanted in dogs.

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities July 1, 1965, through June 30, 1966

MEDICAL ARTS AND PHOTOGRAPHY BRANCH

Malcolm S. Ferguson
Branch Chief

I. SUMMARY

The Medical Arts and Photography Branch is continually striving to provide NIH scientists with the best available techniques of art and photography in support of their clinical and laboratory research. Thus, the quality, quantity, and promptness with which MAPB personnel respond to work requests from the I/D's are subjects of continuing concern. Training is also an activity receiving year-round attention. Instruction was received by several persons at nearby schools. Other training was received by MAPB employees at factory installations and at institutes operated by professional groups. Additionally, special seminars dealing with such topics as color--its photography and duplication, legibility, and animation techniques were held "in house" for selected employees.

Since MAPB was reorganized a year ago, benefits have been derived from the clarification of administrative responsibilities and the stimulation some employees received from managerial recognition. Increased production in some activities is conspicuous. The centralization of purchasing and travel responsibilities has resulted in better budget information as well as tighter material and equipment management.

Medical and general art services were sharpened by organizational and policy changes. During the year a work-performance record was set by the Drafting Unit. Unusual pieces of medical art were drawings of the developmental stages of four newly-discovered simian malaria parasites, models of arthritically crippled hands and feet, a model of the human eye, and a new rat cranial atlas. Work on publications and exhibits design continued in general illustration. One 1966 exhibit has been requested for long-term showing in the Smithsonian Institution. Design effort for exhibits is being channeled toward light-weight, sturdy forms which require less setup time and shipping protection.

The reorganization of the photographic services makes possible the immediate recognition of any lag in production. Past backlogs are gone. Trials are being made of roll film instead of cut film for use in patient and other clinical and scientific photography. The roll film is less expensive to use. There is a slight trend toward an increasing use of 2" x 2" slides over the older heavy $3\frac{1}{4}$"x 4" size.

Requests for motion picture work increased, especially for films of the "research report" variety. Filming in support of clinical studies and laboratory research has continued. MAPB capability in animation has increased, and there are prospects for its improvement in FY 1967.

II. BRANCH PROGRAMS

A. Objectives

The objective of MAPB is to support the research programs of NIH with visual records of the clinical and biological problems and other phenomena which are being studied, and to complement the verbal dissemination of scientific information to both professional and public groups through associated photographs, motion pictures, and illustrations.

B. Current Programs

The programs of the Branch reach across a wide variety of art and photographic services: still and motion picture photography of clinical and laboratory research involving humans, animals, and related biological and physical material; photomacrography and photomicrography; public information photography; art work concerned with clinical illustration, graphics, statistical drafting, general illustration, exhibits design, moulage, and model fabrication; and cinematography including normal and high-speed camera work, editing, animation, and motion analysis.

During FY 1966, in addition to routine motion picture work,(i.e. patient and animal motility studies, interview and surgical operation recording, records of laboratory procedures, and the application of cinematography to research) several "scripted" research report films were completed, e.g. "Technique of Platelet Transfusion" for the Acute Leukemia Task Force, NCI; "Birth Defects: A Research Report" for NINDB; and "Pathogen-Free Animals" for the Laboratory Aids Branch, DRS. A film on the development of the NIAID vaccine program is underway.

Currently the photography service is trying out roll film instead of cut film for taking pictures of patients and for certain other clinical uses. It appears that in many instances the 35mm and 120-size roll color film can be used very satisfactorily. Roll film is much more economical both as to film stock and time required to handle and develop.

Two years' experience with a new work request form and reporting system has confirmed that the system is too expensive to use. Excessive time has to be taken to fill out the form, and the cost of translating the data to punch cards for data processing is high. During the past year a work sampling study was made under the supervision of a management analyst. The study is part of a Division-wide program to find an efficient way to record and report work accomplished. The information obtained will enable the Branch to project its budgetary requirements more realistically.

The responsibility of MAPB regarding exhibits is gradually changing. At present MAPB does the design and oversees the contracting and construction of exhibits and keeps the historical record of exhibits for the Institutes and Divisions. Its work on repairing exhibits is limited to "cosmetic" touches. MAPB is no longer concerned with the warehousing, shipping, set-up, striking, receiving, and extensive repairing of exhibits.

C. Program Progress and Accomplishments

Activities of the medical illustration service have resulted in several items worthy of attention. Drafting personnel have compiled a remarkable record of production. The number of completed charts and graphs exceeds by 30 percent the average production of the past four years. The number of employees has held steady, overtime is lower than it has been for eight years, and the character of the charts and graphs produced is unchanged. Response of the group to the challenge of increasing work plus a managerial change are probable causes for the increase in production.

Field work of the Laboratory of Parasitic Diseases, NIAID, has disclosed the existence of hitherto unknown simian species of malaria. Each of the developmental stages of four new species has been painted in color by a medical artist. In all, 25 to 30 illustrations were made for each species, and these are to be published in a monograph.

Plastic materials have been used for several years to make "to size" casts of the hands and feet of patients afflicted with arthritis. Making a series of these casts results in reproductions which show step-by-step the pathological change which takes place. This activity was revived during the year after a lapse of several months due to the death of the principal scientist who formerly requested these services.

An "Atlas of Cranio Facial Development in the Rat" has been completed during the year. The medical art service contributed all of the 50 illustrations.

A new eye fundus diagram chart was designed for use by the Ophthalmology Branch, NINDB. The charts permit the observer to record consistently and proportionally what is seen in the eye. Thus, by comparison of an early diagram with a recent one, changes are readily noted.

Another important project now under development is a life-size model of the human eye for NINDB. Technical problems were encountered when simulations of the cornea, iris, and retinal vessels were attempted. These difficulties have been overcome, and it is expected the model will have great instructional value.

The general illustration services continued to be active in the layout and design of NIH biomedical publications. Among the more important ones completed were: A Gift of Time, Cystic Fibrosis, For Your Information, Human Growth Hormone, Peptic Ulcer, Project Patients Must Be Fit, Psoriasis, Sickle Cell Anemia, Special Research Resources For The Biomedical Sciences, and Systemic Lupus Erythematosus.

During the report period, 24 exhibits were designed and 21 were revised and repaired. NIH exhibits have been on display at many important biomedical meetings in the U.S.A. and some at foreign meetings.

Design attention was given to constructing light-weight, easily-set-up exhibits. Using aluminum frames and 4' x 5' sheets of foam plastic cored material, a special four-panel exhibit was made and used on a trial basis for NIDR. Another NIDR exhibit, "Facts About Fluoridation", is being made to Smithsonian specifications for inclusion in the Institution's Hall of Medicine for long-term display.

MAPB artists have gained much valuable experience from several complex animation sequence assignments and have demonstrated increasing proficiency with this type of medium. However, having no formal training in animation, the artists encounter some problems with the more sophisticated types of presentation. This need has led to an arrangement whereby one artist is receiving apprentice experience in animation production at a recognized film studio.

The reorganization of the Photography Section is a little over one year old. Responsibility for different kinds of photographic work and the administration of the Section have been sharply delineated, and this has resulted in greater efficiency. Since the reorganization last year each position description in the Section has been updated.

Labor-saving equipment put into operation last year continues to yield dividends. Line copy negatives are all developed by automated equipment. About 80 percent of the continuous tone emulsions are also developed by the automatic processor. Negatives from "one time only" photo situations and all those exposures where the standard emulsion speed of the film is being modified require custom development. These cases make up the remaining 20 percent of the continuous tone materials handled in the laboratory.

There is a continuing trend on the part of MAPB clients toward greater dependence on the 2" x 2" slide. This size is not only more easily stored and transported, but it costs much less to produce than the older heavy glass $3\frac{1}{4}$" x 4" slide. In a recent month, 3,500 2" x 2" slides were produced, compared to 1,400 of the $3\frac{1}{4}$" x 4" size.

Pictures of NIH research activities taken by MAPB photographers have been requested and published in many well-known magazines during the year. Examples are: World Health, Medical World News, Newsweek, National Observer, and the New York Times magazine. Slide sets made for training and other purposes covered such subjects as procedures for food handlers in the Clinical Center, the nurse recruiting program, and the nursing facilities and out-patient area of the Clinical Center.

The principal part of the photographic work done by MAPB is in support of on-going research programs of NIH scientists. Sometimes this work has a consultive aspect. Several laboratories have acquired their own photomicrographic equipment. MAPB personnel are frequently asked to demonstrate the steps in calibrating the equipment, to test for optical alignment, and to show how the equipment is used to take photomicrographs. Other consultive services involve advice on the custom development of photographic emulsions where stated times, temperatures, and chemicals are varied to achieve a specific result.

A different kind of photographic service was given to the Division of Research Facilities and Resources. The ID photo booth was moved to the Westwood building and in two days all employees were photographed. Personnel lost very little time, and only one photographer was required to keep the photo booth supplied with chemicals and photographic paper. In addition, all NIH Commissioned Officer personnel (700) were provided with new identification photographs with a minimum of expense and no interference to routine photographic activities.

The motion picture activities of the Branch were organized into a Section in January 1965. Since that time the staff has gained experience in working as a team. An operator for the animation camera equipment has been trained through observation of operations in outside motion picture firms and through association on the job with a consultant animation cameraman. The motion picture personnel and artists concerned with animation production have also had the benefit of seminars presented by an animation director, a color motion picture film expert, and a medical communications specialist.

In addition to the "scripted" motion pictures, about 30 research-related projects of varying length and complexity were completed during the year. Some subjects covered dealt with: techniques in plaster limb casting, high-speed camera studies of the effect of a liquid being injected into another liquid and the turbulence in liquids passing through artificial heart valves, and the behavior of infant hamsters with neurological lesions. Motion picture coverage of the response to therapy of patients continued to be a service that was regularly requested by clinical investigators. All cinemicrography done by the Branch is performed in the Photography Section, which has the requisite microscope and associated equipment.

Editorial equipment of the Motion Picture Section is being upgraded, and a special editing area has been remodeled. This will provide a cleaner working environment and one that is less busy and noisy so that sound editing can be accomplished properly. In addition to the editing of "scripted" films and research reports, the Branch is called on continually to edit and provide titles for film footage exposed by research personnel.

The animation production activities of MAPB have developed and moved forward to the extent that sequences of considerable complexity have been photographed. However, it is the policy of the Branch to use animation only in those instances where the action cannot be covered by live photography or where diagramatic presentations enhance the communication effectiveness of a film.

D. Problems

One problem which was reported last year continues to be very bothersome. The water supply to the photographic service area contains dirt and other contaminating substances which cause spots on both negatives and prints. Filters have been installed, but some contaminants can still pass through the filtration equipment. Water coming from the filters is sometimes so low in pressure that the temperature controls do not work properly. Ideally, wash water should be at the same temperature used for the development process, i.e. 68° - 70° F. Wash water of a temperature much higher than this can ruin the pictures.

A most pressing problem is space. MAPB is not centralized, and the physical separation of art services from photographic services, with the motion picture services in another building and the Branch Office separated from all its Sections, makes administration difficult and coordination a formidable task. Added to the management problems that separation of the different Sections creates, there is the dismal location of the motion picture service in a sub-basement area. The model and moulage activity is also located in the sub-basement of Building 1 and it suffers by being detached from the rest of the medical illustration program.

Another problem is the difficulty of recruiting competent photographic laboratory personnel. Working in a photo darkroom has little glamour. At times the work is tedious and repetitive, and the photographic laboratory technician usually has little social contact while he is working. The civil service pay scale for a routine photo lab technician is not sufficient to attract people. MAPB has several good photographic laboratory employees but there is no backstop in case one goes on leave or falls ill.

E. Program Plans

Contracting for outside services is carried on in the areas of drafting, photography, motion pictures, and general illustration. It is believed some of these contracting activities can be centralized and a gain in efficiency realized. During the report period, travel and purchasing have been centralized in the Branch Office, and better budgetary control of both materials and equipment has occurred.

Within the next fiscal year (1967) it is planned to install and have in operation equipment to automate the processing of photographic prints.

MAPB has never had a photo-science specialist as a member of its staff. The quality and variety of the still and motion picture photography requested from MAPB is of such a complex nature that the addition of a photo-scientist to the staff is indicated. To fill this need, a recent graduate of the College of Graphic Arts and Photography, Rochester Institute of Technology, has been recruited and is expected to join the MAPB staff at the beginning of next fiscal year.

The picture and negative files have grown to such an extent that the "home-made" filing system has become overburdened. A better, more flexible system is required. Steps have been taken to learn the features of some other filing systems used by organizations with much larger picture collections. During the next year it is hoped that a new system for filing NIH photos will be adopted. The changeover will require time, equipment, and the addition of temporary personnel.

The NIH exhibits program has never had the benefit of an overall, expert evaluation. During the summer of 1966, the Director, Office of Learning Resources at the University of California School of Medicine in San Diego will be here for the express purpose of initiating a study to determine the effectiveness of our exhibits for conveying ideas.

Steps have been taken to increase the motion picture animation resources. Fortunately, an arrangement was made with Wexler Film Productions in Los Angeles to have one of the MAPB artists receive animation apprentice training for three months. If this training program proves successful, MAPB will probably extend the same opportunity to at least one other MAPB artist.

F. Publications

Bartner, H.C.: Sketching retinal changes. Visual Medicine. Vol. 1, No. 2, June 1966.

Taylor, V.E.: Classification and evaluation of photographic personnel. Industrial Photography. 14: 28, Nov. 1965.

Wilcox, M.A.: Paraplex - A new biological embedding resin. Med. & Biol. Ill. Vol. 15, No. 4, Oct. 1965.

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities July 1, 1965, through June 30, 1966

LABORATORY AIDS BRANCH

Dr. Robert J. Byrne
Branch Chief

I. SUMMARY

The Laboratory Aids Branch is responsible for the production of laboratory rodents and rabbits; for the production of germfree and pathogen-free animals; for the conditioning of dogs, cats, primates, and feral animals; for special animal-related services; for production of animal blood and animal blood products; and for the preparation of bacteriologic and tissue culture media and clean glassware.

During the past year, planning for all phases in the development of the NIH Animal Center continued. Experience gained during the first full year of operation in the new Phase I facilities, and the response of NIH investigators to the resources have been favorable. There has been a marked increase in demand for services in both the Farm Animal Unit and the Dog and Cat Conditioning areas.

Public interest in the NIH policy on the acquisition of dogs and cats for biomedical research has resulted in increased demands on staff time to answer outside inquiries. Answers to inquiries reflected our established policy of improving dog and cat procurement methods, upgrading the quality of dogs and cats for issue, and seeking means of utilizing other animals and resources whenever feasible.

Space limitations have prevented significant increases in production of conventional rodents and rabbits. Approximately 10 percent of total NIH needs for these animals are met through outside purchase.

Pathogen-free animal production and RIF-free egg production have been established on a regular basis and are filling a significant NIH requirement.

Renovation of the media production area and the introduction of night shift (4 p.m. to 12:30 a.m.) into both Media and Glassware Preparation areas have provided greater operating efficiencies and expanded services.

II. BRANCH PROGRAMS

Production of Laboratory Rodents and Rabbits

A. Objectives

To furnish high quality laboratory rodents and rabbits by production in closed colonies under a systematic breeding program.

B. Current Programs

Production Program: During the past year, emphasis has been placed on improving management practices designed to: (1) balance the animal production program to keep surpluses to a minimum; (2) reduce administrative overhead through simplified accounting procedures.

The volume of animals produced remained about the same due to space limitations.

Genetics Program: This program is designed to maintain the genetic integrity and desired features of the inbred lines of mice, rats, and guinea pigs. These characteristics are insured through the systematic use of immunogenetic testing and by maintaining a selective program. Close liaison is maintained with Institute/Division investigators to determine suitability of issued inbred animals.

Planning Program for NIHAC Phase II: This program is concerned with the development of operational plans, equipment, training, and the logistics necessary to the implementation of the Phase II production facility at NIHAC. The professional staff continues to visit other facilities to gather additional information on producing and monitoring pathogen-free animals.

C. Program Progress and Accomplishments

During FY 1966 the Laboratory Aids Branch again produced over one million laboratory rodents and rabbits, for a total dollar volume exceeding $920,000. Many animals were bred to specific investigator requirements. Shifts in the production operation were closely geared throughout the year to research requirements. Approximately 10 percent of NIH intramural needs for rodents and rabbits were purchased directly from outside sources.

In collaboration with the staff in the Pathogen-free Production Unit, the Genetics Unit was able to establish inbred strains of mice in isolators. The DBA/2N strain, characteristically a low producer, was the first strain selected.

A Program of Requirements for Phase II NIHAC was completed with RFPB during the year. Considerable effort was devoted to answering inquiries from the Bureau of the Budget relating to this building program.

Planning activities during the past year have been broadened to provide for an orderly transition of activities from Bethesda to NIHAC over an extended

period of time and have included consideration of total NIH needs for animals and methods of supplementing in-house production. Plans have been formulated for the training of personnel and a systematic rotation of experienced animal caretakers, in order that a competent force will be available to staff the NIH Animal Center.

A Policy and Procedure Memorandum was developed which established better defined guidelines for the handling of surplus animals.

D. Problems

The most significant problems in the Animal Production area during FY 1966 related to diseases associated with breaks in sanitation. For example, salmonellosis necessitated eradication of the Strain 13 guinea pig production colony and the Flemish rabbit colony was almost decimated due to coccidiosis. Fortunately the genetic back-up colony of Strain 13 guinea pigs did not become infected and could be used to establish a new production colony. Overall sanitary practices and the physical environment have been carefully reviewed with the assistance of the Environmental Services Branch and corrective actions have been taken wherever feasible. There are remaining problems, associated with the physical plant, that probably cannot be satisfactorily corrected without considerable financial investment. The ultimate phasing out of animal production in wings B, C, and E of Bldg. 14 precludes any major construction or alterations.

E. Program Plans

The development of plans for transportation and logistical support for the NIH Animal Center will dominate program planning during the year. New equipment is being developed and evaluated, methods of conversion from conventional to pathogen-free of many inbred strains are in the developmental phase, and plans are being made for training personnel for the pathogen-free operation prior to the completion of the facility.

During the coming fiscal year, further concentrated effort will be made to balance our animal production programs to meet the research needs and at the same time to keep the numbers of excess animals to a minimum. A more comprehensive survey of Institute/Division rodent and rabbit needs for FY 1967 is now being completed and should be helpful to program planning and implementation. It is anticipated that APS:LAB will play a more active role in coordinating outside procurement of rodents and rabbits for intramural programs.

There will be an increased effort to improve sanitation, making use of the available resources, yet keeping within the limitations placed on major alterations. Breeding units of the valuable inbred strains of guinea pigs will be housed in modified Horsfall units. Consideration will be given to contract arrangements as a back-up on valuable inbred strains of animals. More effective means of monitoring will be established.

Production of Special Animals

A. Objectives

To furnish NIH investigators with laboratory animals whose associated flora and fauna is defined in some specific manner, i.e., germfree, RIF-free, Lactobacillus monocontaminated, pathogen-free, etc. To develop systems and methods for more efficient production of a greater variety of these animals.

B. Current Programs

Germfree rats, mice, and guinea pigs are being produced in stainless steel and flexible plastic isolators. A careful monitoring program assures that these animals are germfree. Limited attempts to develop a diet and system for raising cesarean-derived germfree hamsters have not been successful.

Pathogen-free rats and mice are provided through the breeding of cesarean-derived animals within a barrier system. Current methods of producing pathogen-free animals are critically appraised for their suitability to future operations at NIHAC. A program to provide pathogen-free guinea pigs is underway.

Fertile hen's eggs free of the Resistance Inducing Factor (RIF) are produced by maintaining a flock of chickens within the barrier system. The birds are housed in individual cages, bred by artificial insemination, and regularly monitored for RIF.

C. Program Progress and Accomplishments

The current rate of issue of germfree animals to NIH laboratories approximates 11,000 per year. This is a 40 percent increase over issues a year ago. This rate also represents the peak potential of present space, personnel, and isolators. There have been increased requests for germfree animals, equipment, and technical information by NIH investigators outside the regularly established germfree laboratories.

Pathogen-free animals are being issued to NIH laboratories at the rate of 26,000 animals per year. This is an increase of approximately 60 percent over a year ago. Recently there has been a large increase in requests for pathogen-free rats. Production is being increased to meet this demand.

The second generation of RIF-free chickens is now in production. Productivity and fertility are good, with the rate of issues being 8,800 eggs annually.

Quality control and microbiological monitoring programs are being utilized for all groups of animals. Contamination rates are low. Evidence of high quality in all animal groups comes not only from the monitoring program but also from increasing requests of NIH investigators for these animals.

D. Problems

Attempts to establish production of germfree hamsters and pathogen-free guinea pigs have been unsuccessful. New approaches will be tried and in the case of pathogen-free guinea pigs there is confidence that success will be achieved.

Maintaining adequate positive air pressure in the pathogen-free production rooms has been a continuing problem. It appears that the basic source of the problem, namely, cracks up to one-half inch wide between the air ducts and the filtered air inlets to the rooms, has been located.

E. Program Plans

Continued efforts will be made to produce pathogen-free guinea pigs and germfree hamsters.

Production of pathogen-free mice and rats will be increased through more concentrated use of the space available.

Plans have been completed to alter the method of production of RIF-free eggs to provide for greater security against contamination. Necessary new construction, renovations, and new equipment have been planned in detail. The new system calls for two flocks to be housed in isolators; one flock to be in Building 14G at Bethesda and the other in a new building at the NIH Animal Center. A prototype isolator is now undergoing design evaluation. When the new flocks are established in the isolators, the present flock of birds will be phased out.

Quarantined and Conditioned Animals

A. Objective

To furnish quarantined and conditioned dogs, cats, primates, and feral animals to NIH investigators.

B Current Programs

The system of initial and quarterly inspections of dog and cat vendor facilities is designed to maintain established prodúrement standards. Purchased animals are quarantined, conditioned, vaccinated, or tested for specific diseases, and issued for investigational use. Efforts are made to purchase and issue animals which best suit the needs for specific research programs.

C. Program Progress and Accomplishments

Projected dog issues will be approximately 5,100 as compared with 4,532 for FY 1965. Cat issues will be approximately 2,800 as compared with 2,670 in FY 1965. Primate issues decreased from 3,161 in FY 1965 to a projected 2,900 in FY 1966.

Inspection of vendors' premises has resulted in the cancellation of one contract. Although the physical plant of this vendor was deemed suitable, inspections revealed violation of acceptable practices. The vendors remaining under contract have, with the advice and guidance of our staff, continued to improve their facilities and management. It is anticipated that these vendors will fulfill the requirements of pending federal legislation regulating the interstate shipment of dogs and cats.

A tuberculosis-like disease has been recognized in opossums under quarantine. The causative organism has been isolated but is as yet unidentified. A tuberculin testing program has been instituted and is being evaluated.

Over the past year there has been a significant change in the primate holding activity as a reflection of Division of Biologics Standards and other Institute program changes. Whereas in the past, quarantined monkeys were issued at a predictable rate, there is now a distinct trend toward prolonged holding. DBS now requests that a fixed inventory of rhesus monkeys be maintained at all times to meet contingencies. A number of other Institutes are turning to us for holding of primates on long term experiments.

A program was instituted in which all dogs and cats are now identified on receipt by tattooing a number in the ear.

D. Problems

Procurement of suitable dogs continues to be a problem and is frequently compounded by outside harrassment of vendors by human society groups. The frequency of visits and inquiries connected with missing dogs has been time-consuming, despite the development and implementation of a formal system for handling.

While improved facilities and treatment methods have reduced dog and cat mortality during the quarantine period, diseases are still a costly problem and preclude issuance of ideal research animals.

E. Program Plans

In collaboration with Comparative Pathology Section, a systematic investigation of the viral and bacterial diseases causing high morbidity and mortality rates in both the dog and cat quarantine populations is projected. The roles of stress, housing, and husbandry practices will also be considered.

Procurement specifications for chimpanzees will be modified to help obtain more healthy animals at the time of purchase, and intensive clinical and laboratory care should minimize disease and death.

Animal Health

A. Objective

To characterize and improve the health of laboratory animals used in the medical research programs of NIH.

To study the causes of naturally occurring laboratory animal diseases and to implement methods of prevention, treatment, and control.

B. Current Programs

The problem of disease control in closed colonies of rodents and rabbits is met through a multi-disciplined approach to monitoring. Comparative Pathology Section pathologists and microbiologists work closely with the Animal Production Section to control and eliminate infectious diseases.

The Section also provides laboratory diagnostic service in conjunction with the disease control programs of the Dog, Cat, and Primate Quarantine Units and the Farm Animal Unit, and provides bacteriologic monitoring service for the Pathogen-free Unit.

Control of infectious diseases of dogs and cats is carried out through a program of routine immunization and treatment. Routine control of infectious diseases of primates is approached through a program of tuberculin testing, bacteriologic monitoring, and treatment. The health of farm animals is maintained through a program of disease prevention and by routine testing.

In addition to programs for controlling infectious diseases, there are studies conducted on nutritional and metabolic diseases.

To support health surveillance of colony animals, there is a program to study, under controlled conditions, naturally occurring diseases of laboratory animals.

C. Program Progress and Accomplishments

In September 1965, salmonellosis occurred in the closed animal colonies for the first time in more than 10 years. Early detection and diagnosis made it possible to confine the disease to one room of guinea pigs and thereby avoid a major health disaster in the colonies. All of the laboratory animal species are susceptible to salmonellosis. The affected guinea pigs, comprising the Strain 13 production colony, were quickly moved from the NIH closed colonies to isolation quarters at NIHAC. Efforts to save these animals were abandoned when it was shown that many of the animals developed subclinical infections. They were disposed of in large scale terminal experiments conducted by NIH investigators who have been the main users of these animals. The production colony is now being restocked from the foundation genetic colony, which was shown by extensive testing to be free of infection. The isolates from a number of infected animals in the production colony were each shown to be *Salmonella typhimurium* var. *copenhagen*.

The results of transmission studies conducted in Horsfall cages demonstrated that other colony animals, especially mice, were highly susceptible to the agent by both oral administration and contact exposure.

An explosive outbreak of coccidiosis occurred in the rabbit colony in October 1965. Three rooms were involved. Using the "test and kill" method in combination with furacin therapy, the infection was eliminated within three weeks after the first oocysts were found. Nearly 100 percent of the animals were lost from one of the rooms, only 10 percent from the other two rooms. Fecal examinations for oocysts had been negative for 25 months prior to the 1965 outbreak, using a composite sampling method which tests 40 percent of the rabbits in each room per month. In later studies of the outbreak, it was found that the severely affected rooms was located adjacent to a building entrance which opened onto the platform of the cage washing building. Soiled cages from a rabbit colony not under LAB supervision had often been stored on the platform. This colony was examined and found to be heavily infected. The infection in the colony has been eliminated and corrective preventive measures have been taken.

For many years, approximately 70 percent of the newly procured dogs of the quarantine colony have suffered from the effects of a respiratory syndrome variously described as kennel cough, bronchitis, tracheobronchitis, distemper, etc. At present, the disease is conservatively estimated to cost NIH $40,000 a year. Studies conducted during the past year have suggested that the syndrome is a bacterial disease precipitated by stress (transportation, new quarters, change of feed, vaccinations, etc.). On the basis of bacteriology, serology, and vaccine studies, Bordetella bronchiseptica is suspected as playing a major etiologic role. Accordingly, sulfonamides are being administered to all dogs during their first ten days in quarantine and efforts are being made to reduce stress.

Attempts to produce chronic murine pneumonia in germfree rats by exposing them to Hemophilus sp. and a common diptheroid of rats, have been unsuccessful to date. Similar studies are in progress using Bordetella bronchiseptica. Since the results of previous vaccine studies suggested that chronic respiratory disease (CRD) lesions may result from hypersensitivity to Bordetella bronchiseptica, both vaccinated and non-vaccinated rats are being used. Serum electrophoresis studies have shown that rats with CRD have unusually high globulin levels. It appears that serum globulin values may be useful in diagnosing CRD in live rats. Heretofore, diagnosis has depended entirely upon the demonstration of typical lung lesions at autopsy.

A serious neurological disease of cats in the quarantine colony evidently was correctly diagnosed as thiaminase toxicity. The affected animals responded to treatment with thiamine and the condition disappeared from the colony when the principal diet was changed to one having less fish content.

The use of other than domestic animals by NIH investigators has continued to create disease control problems. A tuberculoid disease occurring sporadically in the opossums has not been identified, and attempts to develop a workable tuberculin test procedure have been unsuccessful. Recently a pleomorphic acid-fast bacillus cultured from one of the opossums was found to

produce lesions in rabbits similar to those found in the opossum. The results of a large battery of tests on the bacillus thus far indicate that it is a mycobacterial species exhibiting characteristics of both the mammalian and the atypical group.

D. Problems

The Comparative Pathology Section still has not been successful in filling a vacancy for a veterinary pathologist. Obvious salary deficiencies constitute a major problem in this regard. During the year, the Section also lost its clinical pathologist, a man with over 10 years' experience in laboratory animal medicine. This man left for an administrative position.

E. Program Plans

The ongoing programs outlined above will continue.

Research and Development (Collaborative Program)

A. Objectives

To conduct, in collaboration with Research Facilities Planning Branch, a research and devlopment program designed for improving animal facilities, caging, and automated feeding, watering, and sanitary systems.

B. Current Programs

Developmental projects are underway which will produce cage systems designs to be implemented in Phases 1A and II of NIHAC and to support the developmental program in the Pathogen-free Unit.

Materials testing projects are underway which will determine the most suitable animal care equipment comercially available for LAB and the Institutes. Part of this program is in collaboration with Supply Management Branch.

C. Program Progress and Accomplishments

FY 1966 was devoted primarily to the development of caging systems for Phases 1A and II of the NIH Animal Center.

Late in the year, the primate cage was redesigned to provide a more efficient system and provide better housing for the primates. Prototypes were designed and constructed and evaluation should be complete early in FY 1967 for use by the A/E.

The study of photoperiodism in mice was completed during FY 1966. The results indicated that four hours of fluorescent lighting daily produced greater numbers of young born, but that the higher mortality reduced the yield at weaning to the same as 12 hours of lighting. Twelve hours of controlled lighting are recommended for mouse breeding colonies.

During the experimental phase of the above study, it was observed that severe alopecia occurred in all of the animal populations. A light source study was started in October 1965 to compare fluorescent versus incandescent lighting with regard to this problem. Results are not yet available.

The original concept of a water flushing system in conjunction with pans beneath rodent cages has proven impractical. An eight-month evaluation period revealed that rats did not breed well and that respiratory diseases were encountered with alarming frequency. A second concept is being evaluated which involves a conveyor belt in place of cage pans, with a mechanical scraper to remove the debris from the moving belt.

During the year a pre-wash unit was developed and installed on a tunnel washer in Building 14F-1. This was the result of constant problems with clogging of the screens and pumps with sawdust and debris which the vacuum system did not completely remove. The new unit provides a combined vacuum and cleaning system and pre-rinse which flushes directly to the sewer in one operation prior to entry into the cagewashing machine itself. This unit has proved very successful in solving the problem.

D. Problems

The amount of time the members of the R&D Team have been able to devote to their mission has been very limited this year. The RFPB member has been involved in other projects in his branch, and the LAB member has been confronted with additional administrative responsibilities as Chief of APS and in NIHAC planning. If this program is to continue as scheduled, additional personnel should be considered, or more of the experimental work must be contracted. The latter is not desirable since evaluations should be made in LAB colonies and coordinated with LAB programs.

E. Program Plans

During the coming year a study will be made to determine the effect of various light intensities on the productivity of mice.

A prototype rabbit facility will be developed at NIHAC to study the production of healthier animals at a significantly lower cost than current methods. It is planned that an existent structure will be slightly modified to permit evaluation of a more economical production method in a climate of this geographical area.

A prototype automatic rat and mouse feeder for pathogen-free operation will be acquired and evaluated.

Several systems will be designed for study with regard to the transportation of pathogen-free animals from NIHAC to the Bethesda campus.

During the year, a proposal was received for a new type of drinking valve that should eliminate many of the problems associated with the present automatic water system which is under evaluation. Prototypes of this system have been ordered and will be evaluated during the next fiscal year.

Special and Consultive Services to the Institutes

A. Objectives

To furnish special services pertaining to animal programs and animal facilities as requested by the Institutes/Divisions. These services include consultation on animal problems, furnishing of surgical and X-ray services for dogs, cats, primates, and farm animals, and the production and issue of blood and blood products. The experimental surgery staff has furnished consultative services to investigators on such subjects as anesthesia induction, anatomy, and physiology.

B. Current Programs

LAB veterinarians and other specialists furnish NIH investigators with a variety of information on normal animal anatomy and physiology, proper husbandry practices, and disease problems.

Outside inquiries on animal programs and facilities are answered and material for congressional correspondence prepared.

Animal X-ray and surgical services are provided in Building 28. These programs are supported by an intensive care team and long-term holding facilities. Surgical services and post-surgical holding for ungulate animals are provided in the facilities at NIHAC.

LAB staff members are active in the design of animal facilities to be utilized for their programs, such as the NIH Animal Center, and are consulted by the Institutes on design of animal facilities.

LAB provides the space and caretaking service for a limited number of radioactive isotope experiments.

LAB maintains a pilot dog and cat breeding facility in Building T-8 at NIHAC. The prototype white hounds, developed in the dog breeding program, are being utilized to study the feasibility of developing a canine blood donor bank to service experimental surgery in the National Heart Institute.

C. Program Progress and Accomplishments

Outside Inquiries: During the past year, there has been an increased public interest in the problems associated with the procurement of dogs and cats for biomedical research. As a result, we have had a marked increase in public and congressional inquiries concerning both NIH and national programs using animals in biomedical research. At the same time, we have been called on with greater frequency by the outside community for our council on dog and cat procurement specifications, our experiences in NIHAC facilities, and the dog and cat breeding program. While time consuming, these inquiries and

contacts have given our staff new insights into the problems and have furnished an opportunity to contribute to their solutions.

Continued efforts to improve methods for procuring, conditioning, and utilizing dogs and cats for biomedical research have led to a number of significant developments:

a. Utilization of calves and other ungulates as replacements for dogs in surgical studies.

b. An exploratory program to determine the feasibility of a canine blood donor system to fill the National Heart Institute needs for blood in experimental surgery. If successful, this would reduce the annual need for random source dogs by 2,000 and, at the same time, furnish a far better quality of blood.

c. Contract specifications have been developed for commercial breeders to provide a satisfactory supply of dogs specifically bred for research purposes. When implemented these specifications will insure close NIH control over program to insure the lineage of the animals, their immunization status, and their health throughout rearing.

Experimental Surgery: Although requests for X-ray services continue at the same rate, those for assistance with radioisotope studies seem to have increased. Space, special housing, and care for radioactive animals have been provided as needed. Surgical space has also been provided for a number of tracer studies. Facilities for these services remain inadequate.

The number of surgical cases per month has increased from approximately 40 in FY 1965 to approximately 50 at present. Procedures, in some instances, have been of a more ambitious nature than in the past. While animal surgical facilities at NINDB are undergoing renovation, LAB has provided operating room space and equipment to that group for their work with primates.

The number of physiological sampling procedures performed monthly has doubled. For some studies, we have begun to perform cross matching of blood prior to transfusion.

The long-term holding area has housed about 30 more dogs per month than in FY 1965. Not as many farm-type animals have been held in the Surgery Unit as in FY 1965.

Farm Animal Activity: There was a substantial increase in requests for post-operative care of animals, particularly calves and sheep. The calves were mainly heart surgery subjects. The increased use of this species for open heart surgery has necessitated the keeping of increased numbers of bovine blood donors and has also increased the labor required for the drawing and handling of blood.

Carnivore Activity and Blood Program: The dog and cat breeding activity formerly housed in outdoor facilities T-3 and T-4 was moved into Building

T-8. Blood grouping studies were conducted on the hounds and mating systems between A-negative animals were established in anticipation of conducting blood donor trials.

D. Problems

We have lacked adequate facilities to conduct radioisotope experiments on animals.

There have been difficulties involved in hiring technical people for the blood donor program at Poolesville, but this problem may be resolved soon.

There has been a very heavy administrative load placed on the Branch and its sections due to outside inquiries on animal procurement and production problems. However, a more efficient means of handling such inquiries is being developed.

E. Program Plans

Modernization of equipment and surgical instrumentation is planned for the experimental surgery area in Building 28. Closer controls on use of the facility should derive maximum use of the resources available.

We anticipate the realization of the canine blood program and outside procurement of specially bred dogs and cats during the next fiscal year.

There will be increased emphasis on technical, in contrast to caretaker, support in the Farm Animal Unit.

It is anticipated that the Branch will become increasingly involved, as requested, in NIH Institute/Division animal programs.

There will be increased Laboratory Aids Branch involvement in the outside procurement of rodents and rabbits for NIH intramural programs.

Media Production

A. Objective

To produce and issue high quality bacteriological and tissue culture media. To furnish consultative services to the Institutes on related problems.

B Current Programs

Media production is geared to meeting Institute needs as to volume and type of media. To fulfill its mission, the Media Unit employs automated equipment wherever possible and makes use of an efficient cross-reference system of record keeping.

The quality control program of media production was expanded this year to include efficiency testing of a greater number of tissue culture media

concentrates. The Unit has continued to provide concurrent testing of its media in several established tissue culture cell lines. In addition, an improved method of sterility testing has been incorporated into the production procedures.

The demand for tissue culture cells in excess of those required in quality control has continued. No concerted effort, however, has been made to increase the supply of these cells.

A limited program to provide storage of representative cell lines from various investigators in a frozen cell bank was initiated.

The Media Unit assists in the development of improved methods for procuring and storing animal blood, serum, tissues, etc. The Unit also processes these materials for issue.

C. Program Progress and Accomplishments

Based on the first nine months, the number of requisitions processed in FY 1966 will again total approximately 12,000. This is the third year with a monthly average of 1,000 requisitions processed.

In terms of volume of media produced, the projected figures indicated 43,000 liters of bacteriological media and 39,000 liters of tissue culture, an increase of 10 percent.

The Media Unit contracted with a commercial source for the supply of sheep and rabbit blood agar plates in disposable plastic petri dishes. A projected nine-month total of 49,000 commercial plates will be issued in FY 1966 in addition to 193,000 plates of various other types poured by the Media Unit. When compared to a total of 170,000 plates issued in FY 1965, this is a significant increase in the demand for this service.

A projected total of 68,000 tubes of tissue culture cells were issued in FY 1966. All investigators using these cells have continued to report satisfaction with the cells received.

The intensive renovations mentioned in last year's report and recommended in the DRS sponsored space utilization study were completed in April, 1966. Several new concepts in clean room design were incorporated into the renovations, and preliminary results indicate the Unit should have an increased capacity for producing sterile media

The night shift initiated in mid-February is not yet fully staffed. Even with the shift operating at half-strength, there has been improvement in ability to take care of urgent requests.

At the request of several investigators, the Media Unit has undertaken a limited program of maintaining samples of frozen cell lines of various types. The investigator supplies a sample of the desired cell line which

is passed several times to increase the volume of cells. These cells are then frozen and stored in liquid nitrogen to be returned to the investigator when required.

The Media Unit has expanded the use of commercial powdered tissue culture media. Use of this type of product for bulk orders has allowed the Unit to devote more time to the preparation of unusual types of media not commercially available.

D. Problems

The lack of adequate numbers of delivery containers continues to be a problem. Without a steady flow of these containers back to the Media Unit, it is impossible for the Unit to adequately meet the demands of the investigators.

In recent months increased difficulty has been experienced with transporting prepared media to other buildings. On several occasions entire batches of media have been received in the investigators laboratory in an unusable condition. There would be definite advantages to a system of transportation with responsibility for direct delivery to the investigator's laboratory under Branch or Section control.

E. Program Plans

Ongoing programs described above will be continued.

Efforts to further improve methods of automating the production of bacteriological and tissue culture media will be made. Several items of automation equipment are under consideration.

With the increase in production areas for sterile products, a system of monitoring the contamination level in these areas is needed. The monitoring will be done by personnel in the Media Unit so that problems can be corrected immediately.

Glassware Preparation

A Objectives

To provide an adequate supply of clean laboratory glassware for research programs.

To furnish consultative services on problems associated with laboratory glassware.

To furnish cagewashing service to the Clinical Center, Auburn Building, and Patuxent River Laboratory.

To furnish ethylene oxide gas sterilization of heat labile patient and laboratory equipment.

B. Current Programs

In addition to filling Institute needs for glassware, the Unit develops management and technical methods for quality control and for improving the distribution and return of glassware.

The cagewashing unit is now washing the rubber backed carpets for the Clinical Center and outlying buildings.

C. Program Progress and Accomplishments

Glassware issues projected through the end of the fiscal year will total approximately 7,683,000 pieces, an increase of 9.1 percent over FY 1965.

Additional funds became available to the Unit for the purchase of new glassware during the last half of the fiscal year. It is hoped that this will enable the Unit to establish more adequate reserve stocks of sterile glassware, particularly serological pipettes.

A night shift was inaugurated in the Glassware Unit in February. Even with a partial crew on duty, virtually all overtime used for processing glassware has been eliminated.

A new deionizer was installed this year increasing the Unit's capacity to produce deionized water by 100 percent. It is quite evident that there would not have been enough deionized water available for use by the night shift without this unit.

A "Cryotherm" gas sterilizer was installed this year so that small items such as telephones, plasticware, clothing, etc., can be sterilized more quickly and efficiently. By using this sterilizer we can add controlled heat and humidity to the chamber, thereby speeding up the sterilization process.

A projected total of over 369,000 cages, racks, and associated pieces of equipment will be processed this year. The cage washing unit began serving the DBS facilities in Building 14.

D. Problems

The shortage of containers required to handle glassware continues to be the most serious problem. Metal trays for return of dirty glassware are in critical shortage.

E. Program Plans

Efforts to automate pipette wrapping and other operations will continue. A new type of plastic sheeting that will withstand dry air sterilization and yet is adaptable for use on a wrapping or sealing machine has been located.

Testing of "Corex" pipettes will continue. The manufacturer claims they will last six times longer than regular pipettes.

In cooperation with the Supply Management Branch and several plastic manufacturers, effort is being made to obtain a plastic container to replace the expensive stainless steel tray now used to transport dirty glassware.

PUBLICATIONS AND PATENTS

Publications

Formal, S.B., Labrec, C.H., Palmer, A.E., and Falkow, S.: Protection of monkeys against experimental shigellosis with attenuated vaccines. J. Bact. 90: 63-68, Jul. 1965.

Gaddis, E.M., Fisher, L.B., Miller, C.E., and Rosenberg, L.E.: Pathologic aminoaciduria in experimental ascorbic acid deficiency. Proc. Soc. Exp. Biol. Med. 120: 185-187, 1965.

Ganaway, J.R., Allen, A.M., and McPherson, C.W.: Prevention of acute Bordetella bronchiseptica pneumonia in a guinea pig colony. Lab. Anim. Care 15: 156-162, Apr. 1965.

Potkay, S., Ganaway, J.R., Rogers, N.G., and Kinard, R.: An epizootic of measles in a colony of rhesus monkeys (macaca mulatta). Amer. J. Vet. Res. 27: 331-334, Jan. 1966.

Films

Pathogen Free Animals. A 15-minute, 16mm, sound film intended primarily to inform visitors to Laboratory Aids Branch about methods used to produce pathogen-free animals, and as an aid in employee training. Produced by LAB and MAPB.

Presentations

Bohner, H.J.: Some practical aspects of producing and distributing germfree and pathogen-free animals. Pharmaceutical Manufacturers Association, Washington, D.C., March 1966.

Byrne, R.J.: Procurement and conditioning of dogs for medical research by the National Institutes of Health. Eastern Shore Veterinary Association, Easton, Maryland, September 1965.

Ganaway, J.R.: Respiratory Disease in Dogs. Ibid.

LeMunyan, C.D.: Photoperiodism in mice. 16th Annual Animal Care Panel, Philadelphia, Pennsylvania, November 1965.

Serial No. DRS-LAB-1
1. Laboratory Aids Branch
2. Animal Production Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: THE EFFECT OF LIGHT ON THE PRODUCTIVITY OF MICE

Previous Serial Number: 4.1

Principal Investigator: Cobert D. LeMunyan

Other Investigators: William R. Clark, Jr., RFPB

Cooperating Unit: Research Facilities and Planning Branch

Man Years (computed for the 12 month period)
Total: 1.2
Professional: .2
Other: 1.0

Project Description:

Objectives: To study the effect of various day lengths on the productivity of mice. To study the effect of various light sources.

Methods Employed: The cycle is varied and the light intensity is held constant with a fluorescent source. To study the effect of light intensity, temperature, relative humidity, and duration of light exposure held constant and the source varied from incandescent to a number of types of fluorescent light.

Major Findings: A definite trend of high birthrate during short light periods to low birthrate under continuous lighting was established. However, due to higher mortality in the short day groups, the yield of weaned animals from the shortest day did not differ significantly from the twelve hour day groups. It was concluded that a controlled daily lighting period of 12 hours is optimum for production of mice.

Data on the second part of the study on the effect of different light sources are still being compiled.

Significance: The findings of this research will be utilized in the planning of the rodent and rabbit buildings at the NIH Animal Center, Poolesville, Maryland.

Proposed Course of Project: The first part of this study is complete. Light intensities and sources are currently under study.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-2
1. Laboratory Aids Branch
2. Comparative Pathology Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: CHRONIC MURINE PNEUMONIA OF THE ALBINO RAT

Previous Serial Number: 4.9

Principal Investigator: James R.Ganaway

Other Investigators: Anton M. Allen

Cooperating Unit: Animal Production Section, LAB

Man Years (computed for the 12 month period)
Total 1.7
Professional: .2
Other: 1.5

Project Description:

Objectives: To isolate and characterize etiologic agents. To perform transmission studies with each suspected agent. To recommend measures for prevention and control of this disease complex under colony conditions.

Methods Employed: Microbiology, immunology, and pathology methods were employed.

Major Findings: Long term transmission studies were performed, using two bacterial suspects (based on isolation studies, viz. diptheroids and a Hemophilus sp.) and limited numbers of germfree rats held in plastic isolators. Neither of these organisms, alone or in combination with each other, appear to be capable of causing chronic respiratory disease in albino rats. A vaccine trial in the General Purpose Rat Colony using Bordetella bronchiseptica antigens, instead of being protective as was anticipated, resulted in accentuated morbidity and mortality. Because of the possibility that hypersensitivity may play a major role in this chronic disease, as indicated by the vaccine trial, the vaccine experiment will be repeated in conventional and cesarean-derived rats held in plastic isolators.

Significance: This disease complex is the greatest cause of morbidity and eventual mortality in rat colonies. Affected rats are unfit for research, particularly when destined for long term or toxicity studies.

Proposed Course of Project: Continuation.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-3
1. Laboratory Aids Branch
2. Comparative Pathology Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: FOCAL NECROSIS OF THE LIVER OF RABBITS

Previous Serial Number: 4.12

Principal Investigator: James R. Ganaway

Other Investigators: Thomas D. Moore
Anton M. Allen

Cooperating Units: Animal Production Section, LAB

Man Years (computed for the 12 month period)
Total: 2.0
Professional: .5
Other: 1.5

Project Description:

Objectives: To characterize and identify the etiologic agent. To study the pathogenesis of the disease through experimental transmission studies. To recommend measures for control or prevention in the rabbit colonies.

Major Findings: Transmission of the disease from sick to healthy rabbits by contact exposure has continued to be successful. Serial propagation of the etiologic agent in embryonated hen's eggs has been accomplished. The disease has been reproduced experimentally in rabbits by feeding infected egg tissue suspensions. Extreme liability of the vegetative phase and the formation of a spore has been confirmed. Repeated attempts to grow this obligate intracellular parasite in primary and cell line tissue cultures have failed.

Significance: Essential to our knowledge of laboratory animal diseases. This disease continues to exist endemically in the NIH rabbit colony.

Proposed Course of Project: Continuation.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-4
1. Laboratory Aids Branch
2. Comparative Pathology Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: SALMONELLOSIS IN GUINEA PIGS

Previous Serial Number: None

Principal Investigator: Thomas D. Moore

Other Investigators: James R. Ganaway
Anton M. Allen

Cooperating Units: None

Man Years (computed for the 12 month period)
Total: 2.6
Professional: .6
Other: 2.0

Project Description:

Objectives: The study of a salmonella outbreak in a highly inbred guinea pig colony.

Methods Employed: Gross and histopathological techniques, bacteriological, serological, and transmission studies were employed in this study.

Major Findings: One of a pair of Strain 13 guinea pigs from the Animal Production Section submitted for autopsy September 1965, showed marked splenomegaly with focal necrosis of the liver and spleen. The second animal showed only the signs of metastatic calcification. Samples of heart blood from both animals were negative for bacteria. A guinea pig with the above spleen and liver involvement was received the next day. A gram-negative, non-lactose fermenting, motile rod was isolated in pure culture from the spleen. Preliminary biochemical characterizations strongly indicated salmonella. Serological tests produced a positive reaction with Group B antiserum. More extensive biochemical tests from different animals were sent to the Communicable Disease Center, Atlanta, Ga., for species identification. All of the cultures were identified as S. typhimurium var. copenhagen. All other isolations made during this investigation from animals presenting a similar pathologic picture, reacted with Group B antiserum. Two cultures sent to CDC near the end of the outbreak were of the same species and variety.

A fecal survey of the caretakers produced one carrier of salmonella. This isolate was identified as S. heidelberg. A check of fecal samples from 119 guinea pigs of the foundation genetics colony of Strain 13 were negative for salmonella and shigella.

The literature has a paucity of information of salmonella infections in the guinea pig although the probable first observation of salmonellosis in this animal was made by Theobald Smith at the turn of the century. Smith termed the disease pseudo-tuberculosis because of the striking tubercle-like nodules in the livers and spleens of his animals. He later recommended calling this agent Bacillus pestis-caviae and cites the loss of an entire guinea pig stock at Rockefeller Institute due to this agent.

In this outbreak all cagemates of animals diagnosed positive for salmonella by post mortem examination were autopsied. As a result 146 animals were examined, 91 females and 55 males. Of the 91 females, 28 were positive, 63 were negative; there were 13 positive and 42 negative males.

Significance: The unquestioned pathogenecity of this genus for all mammals points out the continuous need for extreme diligence and care in the husbandry of laboratory animals. The general lack of efficacy of antibiotics in completely eliminating this infection and the ease with which the carrier state is induced by this organism, reemphasizes the necessity for careful management.

Proposed Course of Project: Continuation. A report is being prepared for future publication.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-5
1. Laboratory Aids Branch
2. Office of the Chief
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: A STUDY TO DETERMINE THE EPIZOOTIOLOGY OF TYZZER'S DISEASE IN RABBITS

Previous Serial Number: 4.13

Principal Investigator: Charles W. McPherson

Other Investigators: Thomas Moore

Cooperating Units: Comparative Pathology Section, LAB
Animal Production Section, LAB

Man Years (computed for the 12 month period)
Total: Less than .05

Project Description:

Objective: To provide a description of the epizootiology of Tyzzer's disease in rabbits.

Methods Employed: Standard epidemiologic methods of recording and analyzing on cases and controls, such factors as age, sex, ancestry, littermates, previous illness history, parity, and litter size; determination of case incidence according to time, place, and environmental changes.

Major Findings: Tyzzer's disease in rabbits tends to concentrate in certain litters and epizootics are more likely to occur when the population of susceptible age pups is high.

Significance: A certain critical population level of susceptible pups is necessary for Tyzzer's disease to spread epizootically from litter to litter.

Proposed Course of Project: Complete except for writing of final report.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-6
1. Laboratory Aids Branch
2. Office of the Chief
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: THE EFFECT OF CERTAIN BACTERIAL SPECIES ON CHRONIC RESPIRATORY DISEASE OF RATS

Previous Serial Number: None

Principal Investigator: Charles McPherson

Other Investigators: None

Cooperating Units: Comparative Pathology Section, LAB

Man Years (computed for the 12 month period)
Total: Less than .05

Project Description:

Objective: To determine if any of the bacteria used to purposefully contaminate the pathogen-free isolators have any effect on the incidence or severity of chronic respiratory disease in rats.

Methods Employeed: Contaminate isolators with each of the four bacterial species usually used to infect the pathogen-free isolators. Several isolators remain as germfree controls. All rats are kept in a production status for one year. Then they are necropsied and examined for the presence of chronic respiratory disease.

Major Findings: The study is not complete. No data will be gathered until the end of the study.

Proposed Course of Project: Continuation.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-7
1. Laboratory Aids Branch
2. Animal Hospital Section
3. NIH Animal Center

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: INVESTIGATIONS OF EQUINE INFLUENZA

Previous Serial Number: None

Principal Investigator: Julius A. Kasel, LCI, NIAID

Other Investigators: Robert H. Alford, LCI, NIAID
Thomas P. Cameron
Robert J. Byrne

Cooperating Units: Laboratory Aids Branch, DRS
Laboratory of Clinical Investigations, NIAID

Man Years (computed for the 12 month period)
Total: 1.1
Professional: .6
Other: .5

Project Description:

Objective: To determine the clinical and laboratory response, in man and horses, to serially passaged equine influenza virus.

Methods Employed: Equine influenza virus is being passed through 25 ponies grouped into six units. The effects of the virus are observed by clinical responses, virus isolation, and antibody titer increase. Chincogeague ponies are used since they are generally free of naturally occurring influenza antibody.

Major Findings: Viral isolation and antibody titer increase have been consistent in exposed ponies. Clinical response indicates a gradual rise in pathogenicity in subsequent passages. The procedure of nasal washing using a soft flexible rubber catheter increased the chances of virus recovery.

Significance: This study has produced the first detailed description of experimental A/Eq_2 equine influenza under experimentally controlled conditions.

Proposed Course of Project: Studies will be completed by June 1966. A manuscript will be submitted for publication.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-8
1. Laboratory Aids Branch
2. Animal Hospital Section and Comparative Pathology Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: MYCOBACTERIOSIS IN THE OPOSSUM

Previous Serial Number: None

Principal Investigators: Thomas D. Moore
Calvin E. Sevy

Other Investigators: Anton M. Allen
Thomas P. Cameron

Cooperating Units: None

Man Years (computed for the 12 month period)
Total: 1.5
Professional: .5
Other: 1.0

Project Description:

Objective: The identification and delineation of atypical Mycobacterium species isolated from an apparent natural infection.

To study naturally occurring diseases in the opossum caused by Mycobacterium and to develop an effective test and control system.

Methods Employed: Histopathologic and bacteriologic techniques are employed with transmission studies on the suspected causative agent.

Animals dying from naturally occurring diseases are subjected to post mortem examination and culture. Healthy opossums are sensitized with various strains of Mycobacterium tuberculosis and tuberculin tested after an appropriate period of time.

Major Findings: In mid January 1966, a mesenteric lymph node and three tubes of broth each containing a small piece of lymph tissue from an opossum was submitted by the quarantine colony. Post mortem examination had indicated a tubercular-like infection. A suspension prepared from the mesenteric node and another from the pooled tissues in broth revealed acid-fast bacilli in

the latter. Each suspension was concentrated and inoculated into suitable culture media and into guinea pigs. A Proteus sp. and a Streptococcus sp. were isolated before concentration. Within 16 days growth was obtained from the tissue submitted in broth. The mesenteric node has remained negative. The growth consisted of pleomorphic, acid-fast coccobacilli. This organism has been transferred through several passages and has been shown to grow at room termperature and at 42° C. The optimum temperature for growth is, however, 37° C.

Tuberculin tests with avian and mammalian antigens on guinea pigs inoculated with both tissue suspensions were negative at 6 and 11 weeks. No gross pathology was evident in these animals autopsied at 6 weeks. At 11 weeks all animals showed splenomegaly and liver nodules.

Animal inoculation studies to date with the isolated organism reveal definite pathogenicity for the rabbit. Splenomegaly and liver nodules are the most striking features of the infection. Tuberculin tests on rabbits and guinea pigs inoculated with the organism are negative at 3 weeks although patent infection is also occurring in the latter animals.

The work on this agent thus far indicates a mycobacterial species exhibiting characteristics of both the mammalian and the atypical group.

Significance: The documentation of mycobacterial infections in the opossum in his natural habitat is apparently nonexistent. The continued use of this animal for investigative purposes necessitates clarification of this problem.

This feral animal is becoming increasingly used as a research animal, but little is known of its specific diseases. Two cases with typical tubercular lesions have been found by the NIH Quarantine Unit and have stimulated research in this particular area. The most serious deficiency in the surveillance of the opossum for tuberculosis is the lack of defined testing methods. In order to protect investigators using this animal it is felt that a reliable means must be determined.

Proposed Course of Project: Continuation:

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-9
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: EVALUATION OF ATTENUATED SHIGELLA VACCINES

Previous Serial Number: 4.5

Principal Investigator: Samuel B. Formal, WRAIR

Other Investigators: Howard C. May, Jr.

Cooperating Units: Laboratory of Immunology, Walter Reed Army Institute of Research

Man Years (computed for the 12 month period)

Total:	3.15	(This is a fulltime project for Dr. Formal
Professional:	1.10	and his 2-man staff.)
Other:	2.05	

Project Description:

Objective: To attempt to develop and evaluate attenuated, non-pathogenic forms of Shigella organisms for potential use as an immunogenic agent to protect rhesus monkeys against these organisms while under quarantine.

Methods Employed: Hybrid organisms produced by mating Shigella organisms (of several species and serotypes) with E. coli will be given via the oral route by stomach tube. Animals will be challenged with fully virulent organisms at varying intervals to determine susceptibility to the virulent agents. In later studies, 50% of the newly arriving rhesus monkeys will be treated, followed by close observation for differences in incidence of shigellosis between treated animals and untreated controls.

Major Findings: One dose of the hybrid organisms given orally affords protection to challenges with virulent organisms of the same serotype.

Significance: About 15% of the rhesus monkeys imported into the Primate Quarantine Unit shed Shigella organisms of several species and serotypes. The clinical syndrome accredited to Shigella spp. is an acute, bloody

diarrhea which costs more in treatment, loss of condition, and animal deaths than any other disease encountered in primates with the Primate Quarantine Unit colony. An immunizing agent of this nature would greatly decrease problems in conditioning primates and increase the quality of animals issued by the Primate Quarantine Unit.

Proposed Course of Project: Continuation of studies to evaluate the value of such vaccines in the quarantine of primates. A manuscript has been submitted for publication.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-10
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: AN EPIZOOTIC OF MEASLES IN A COLONY OF RHESUS MONKEYS (M. MULATTA)

Previous Serial Number: 4.6

Principal Investigator: Stephen Potkay

Other Investigator: James R. Ganaway
Roy Kinard
Nancy G. Rogers, DBS

Cooperating Units: Comparative Pathology Section, LAB
Laboratory of Viral Immunology, DBS

Man Years (computed for the 12 month period)
Total: Less than .05

Project Description:

Objective: To determine the etiology of a condition in the rhesus monkeys of the Primate Quarantine Unit, which interfered with T.B. test readings.

Major Findings: Serology showed that the disease was measles (rubella) and clinical observations were those of conjunctivitis, maculopapular skin rash, and varying degrees of facial edema and erythema. The clinical features of the natural occurrence of this disease have not been reported previously.

Significance: Clinical diagnosis of measles can now be made in the primate quarantine colony. Interference with T.B. test readings by measles infection may be avoided by postponing such tests.

Proposed Course of Project: Completed.

Honors and Awards: None

Publications: Potkay, S., Ganaway, J.R., Rogers, N.G., and Kinard, R.: An epizootic of measles in a colony of rhesus monkeys (macaca mulatta). Amer. J. Vet. Res. 27: 331-334, Jan. 1966.

Serial No. DRS-LAB-11
1. Laboratory Aids Branch
2. Comparative Pathology Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: FEBRILE HEMORRHAGIC DISEASE OF MONKEYS

Previous Serial Number: 4.8 see also 4.7

Principal Investigator: Anton M. Allen

Other Investigators: James R. Ganaway
Nicola Tauraso, DBS

Cooperating Units: Laboratory of Virology and Rickettsiology, DBS

Man Years (computed for the 12 month period)
Total: 2.5
Professional: .5
Other: 2.0

Project Description:

Objective: To study the pathogenesis of the disease.

Methods Employed: Pathology and microbiology methods were employed.

Major Findings: The clinical features and lesions of this highly fatal disease of monkeys were described in the 1965 Annual Report. Continued histopathology studies have borne out the original findings of hemorrhage in many tissues, systemic vascular stasis, glomerulo-nephrosis, and widespread necrosis of lymphatic tissues. Similar lesions are being found in monkeys given the disease experimentally (transmission studies now being accomplished in closed quarters by the Laboratory of Virology and Rickettsiology, DBS). All evidence to date indicates that the disease is of viral etiology and is not Kyasanur Forest disease. The disease has not occurred in man and has not been successfully transmitted to animals other than the monkey.

Significance: The disease has not been reported in the literature. The causative agent has not been identified and therefore the health hazard to man is unknown. The disease may be introduced into the NIH primate colony again in the future.

Proposed Course of Project: Continuation of pathology studies in conjunction with transmission and virus isolation studies by DBS.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-12
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: EFFECTS OF CERVICAL VAGOTOMY ON WATER AND ELECTROLYTE SECRETION IN THE CHRONIC CARDIAC DENERVATED DOG

Previous Serial Number: 4.15

Principal Investigator: Stephen Potkay

Other Investigators: Willard M. Dagget, Jr., NHI (Previously)
Joseph P. Gilmore, NHI

Cooperating Units: Laboratory of Cardiovascular Physiology, NHI

Man Years: (computed for the 12 month period)
Total: Less than .05

Project Description:

Objective: To determine whether urine flow during water diuresis is influenced by vagal afferents other than those associated with the heart.

Methods Employed: Water diuresis was established in the chronic cardiac denervated dog, a preparation in which all extrinsic cardiac nerves are removed. This was followed by bilateral cervical vagotomy. Parameters of renal function measured were: osmolal clearance, sodium, potassium and calcium excretion, and urine flow.

Major Findings: Cervical vagotomy decreased urine flow and free water clearance independently of changes in sodium, potassium, and calcium excretion, and osmolal clearance. The mechanism response is probably located within the chest and may be pulmonary in origin since all cardiac nerves were removed in the preparation used.

Significance: These findings give further information regarding mechanisms regulating body fluid volume.

Proposed Course of Project: Completed. A paper is being prepared for publication.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-13
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: USE OF SYNTHETIC MATERIALS IN REPAIR OF RUPTURED CANINE ANTERIOR CRUCIATE LIGAMENT

Previous Serial Number: None

Principal Investigator: Thomas P. Cameron

Other Investigators: Calvin E. Sevy

Cooperating Units: None

Man Years (computed for the 12 month period)

Total:	.05
Professional	.05
Other:	.00

Project Description:

Objective: To determine a simple method, using synthetic materials, in the repair of ruptured cruciate ligaments. In experimental animals the stifle joint is invaded and the ligament removed.

Methods Employed: Strips of various Teflon fabrics are attached to plastic buttons supplied by the Biomedical Engineering and Instrumentation Branch. The buttons are milled of an inert plastic, KEL-F. The surgical procedure previously utilized a strip of the patient's thigh connective tissue, the Tensor fasiae latae. This strip was hard to prepare, shredded easily in manipulations, and could be accidentally torn or cut.

Major Findings: The KEL-F button forms a secure proximal anchorage on the lateral aspect of the femoral condyles. The fabric is easily passed with an alligator forcep through holes drilled in the condyle and out to the medial aspect of the tibial crest where it is secured. With no fear of tearing, the fabric ligament can be sutured distally under firm tension. Animals will use the leg again for locomotion in three to seven days after surgery.

Significance: The rupture of this ligament is commonly diagnosed by veterinarians and must be surgically repaired. Although Teflon fabric has been used before to replace the ligament, this project introduces the idea of an improved proximal anchorage. In addition, three different Teflon weaves are being evaluated to determine differences between them.

Proposed Course of Project: Continuation. A manuscript will be prepared.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-14
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: EVALUATION OF RADIATION THERAPY ON CANINE MALIGNANT LYMPHOMA

Previous Serial Number: None

Principal Investigator: Ralph E. Johnson, NCI

Other Investigators: Thomas P. Cameron
Roy Kinard

Cooperating Units: Radiation Branch, NCI
Comparative Pathology Section, LAB

Man Years (computed for the 12 month period)
Total: .19
Professional: .04
Other: .15

Project Description:

Objective: To determine the effect of fractionated whole body radiation on spontaneous cases of canine malignant lymphoma or lymphosarcoma.

Methods Employed: Animals are referred by area veterinary practitioners. Blood samples, femoral bone marrow samples and lymph node biopsy are used to confirm diagnosis. Initially, fractionated doses were compared with single massive doses and sham treatments for efficacy. After fractionated treatment was proven conclusively to be best, protocol was changed to determine optimal treatment with varying intensities and frequencies of fractionated radiation. Efficacy is rated by reduction of total tumor mass, total body weight changes, and effect upon the solid blood components.

Major Findings: Fractionated radiation substantially reduced tumor size with minimal side effects on the patient. While untreated cases terminate in a four to six week period after diagnosis, judicious use of this regime has kept patients in total remission for up to five months.

Significance: The findings of this work can be applied to veterinary and human therapy. Use of radiation in fractionated carefully plotted increments might keep patients in indefinite remission alone or in conjunction with chemotherapy.

Proposed Course of Project: Continuation and eventual preparation of manuscript.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-15
1. Laboratory Aids Branch
2. Animal Hospital Section
3. NIH Animal Center

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: COLOR DESCRIPTION OF CATS

Previous Serial Number: None

Principal Investigator: Kenneth S. Brown, NIDR

Other Investigators: Calvin E. Sevy

Cooperating Units: Human Genetics Branch, NIDR

Man Years (computed for the 12 month period)
Total: .06
Professional: .04
Other: .02

Project Description:

Objective: To devise and utilize a code system to record the coat color and eye color of cats. To utilize this system and to enumerate the cats having different coat and eye characteristics as they are received at the NIH Animal Center.

Methods Employed: Each cat received is examined by NIHAC personnel and the coat and eye color recorded according to a chart. The classification is recorded on the individual record card of each animal then transferred to a data sheet each quarter.

Major Findings: Data have not been analyzed as yet,

Significance: There is a correlation between heterochromia and deafness in the cat as well as other animals. This system allows the investigator to record and analyze the coat color and eye color in large numbers of animals without lengthy word description. This system could also be used to discover other statistical relationships between disease experience and mortality or other descriptive traits.

Proposed Course of Project: Continuation.

Honors and Awards: None

Publications: None

Serial No. DRS-LAB-16
1. Laboratory Aids Branch
2. Comparative Pathology Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1965 through June 30, 1966

Project Title: ACUTE RESPIRATORY DISEASE IN PROCURED ADULT DOGS HELD FOR QUARANTINE AT THE NATIONAL INSTITUTES OF HEALTH ANIMAL CENTER (NIHAC)

Previous Serial Number: None

Principal Investigator: James R. Ganaway

Other Investigators: Thomas D. Moore
Anton M. Allen
Thomas P. Cameron

Cooperating Units: National Institutes of Health Animal Center

Man Years (computed for the 12 month period)
Total: 3.4
Professional: .9
Other: 2.5

Project Description:

Objective: To isolate and identify the etiologic agent(s); to elucidate the disease syndrome and suggest means for prevention and/or control.

Methods Employed: Microbiology, immunology, epidemiology, and pathology.

Major Findings: As a result of isolation studies, controlled vaccine trials, and serological follow-up, Bordetella bronchiseptica is believed to play a major role in this respiratory disease syndrome. Perhaps far greater in importance, however, is the effect of stresses to which these dogs are subjected, starting from the time they are first "earmarked" for procurement until they are issued to the Institutes. The overly stressed animal with a much lowered resistance, in addition to representing fertile ground for opportunistic microbiota, responds poorly to medical treatment. If these conclusions and concepts are tenable and acceptable, we may then understand the failures of vigorous attempts of the past to cope with this costly and seemingly invincible problem. The best animal for research is the animal specifically raised for research. Implementation of such a concept would provide healthy dogs of uniform quality. As an interim measure, pertinent recommendations were submitted to NIHAC.

Significance: Acute respiratory disease occuring in 70% of the procured dogs within 10 to 20 days after receipt at NIHAC is characterized initially by purulent ocular and nasal discharges, tracheobronchitis accompanied by coughing, gagging and anorexia; later by dyspnea and bronchopneumonia terminating in death (approximately 5%). Such a syndrome has been observed in procured dogs at NIH for the past 10 years. A conservative estimate of the actual dollar cost of this syndrome to NIH is $40,000 yearly. In addition, as a result of the protracted illness (20 to 30 days), an undesireable specimen is sometimes issued to the Institutes.

Proposed Course of Project: Continuation.

Honors and Awards: None

Publications: None

LIBRARY
NIH
Amazing Research.
Amazing Help.

http://nihlibrary.nih.gov

10 Center Drive
Bethesda, MD 20892-1150
301-496-1080

Made in U.S.A. by
BEAVERITE
BEAVER FALLS, N.Y.
5C8-246

NIH LIBRARY
3 1496 00528 5237